SECTION 75 LOAD-CARRYING REQUIREMENTS OF A FLEXIBLE PAVEMENT

1611. It is necessary to know something of the way in which traffic loads are carried and spread through various layers of the road structure. Points of equal stress on various horizontal planes at different depths can be plotted from bulbs of pressure. This is explained in detail in Highways by O' Flaherty C A, and similar textbooks. However, it is not necessary to understand these Surface course, Binder course, Base course, Sub-base, Subgrade, Surfacing, Formation Pavement or road construction theories fully before carrying out either the design of operational roads or the British design procedure as both are based on experimental test data over a number of years, rather than theory (see Paragraph 387). The load distribution described below is a sufficiently accurate approximation.

1612. Load Distribution. Consider the case of a vehicle where the area of contact between one tyre and the road surface is about 200 mm square. All the wheel load must be supported over this contact area and this is the part of the road that carries the greatest intensity of loading (see Figure 16.2).

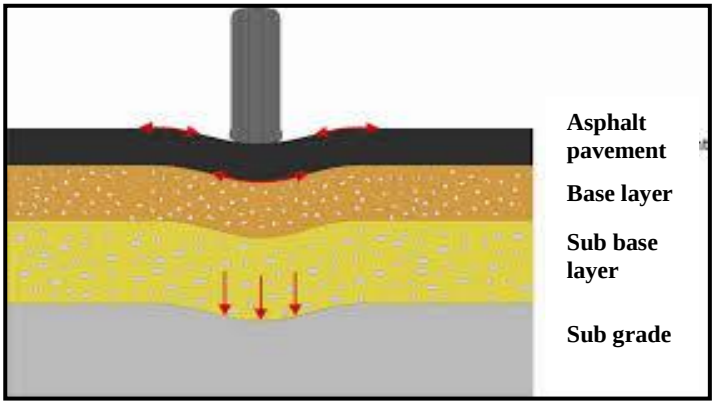

Figure 16-2: Tyre Contact area on Road.

a. As an initial approximation, it can be assumed that the above load spreads throughout the pavement structure to form a load pyramid with the sides at 45° to the road surface.

b. Consider a road structure comprising base course, sub-base and formation. If the tyre contact area is 200 mm x 200 mm, and with a pyramid spread of about 45° to the vertical (see Figure 16.3):

The area loaded at the top of the base course

= 100 + 200 + 100 square

= 400 mm square (ie four times the loaded area at the surface).

The area loaded at the top of the sub-base

= 200 + 400 + 200 square

= 800 mm square (ie sixteen times the loaded area at the surface).

The area loaded at formation level

= 400 + 800 + 400 mm square

= 1600 mm square (ie sixty-four times the loaded area at the surface).

c. Hence a surface load of 4920 kg on an area of 200 mm x 200 mm produces a loading of 12.3 kg on each 100 mm2 of that surface area. This, when transmitted through the road structure, produces a loading of only 0.2 kg on each 100 mm2 of the formation.

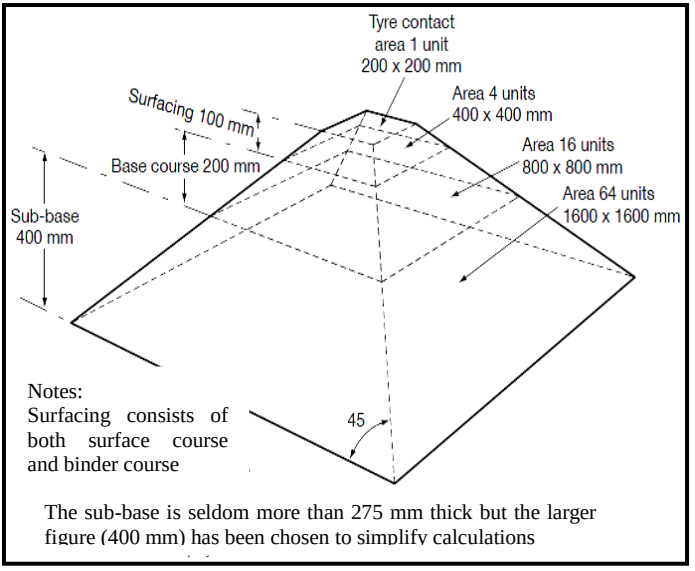

Figure 16-3: Distribution of Load Through Road Structure.