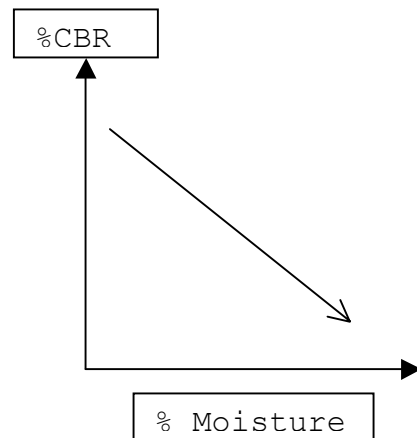


## **Poor Drainage, A Common Cause of Road Failure**

Daljeet Sidhu

Drainage is an important Aspect of road construction and maintenance. It is of two types I) Surface drainage and II) sub surface drainage. Surface drainage is collection of rain water from the surface of the road to side drains or to lower sides in open terrain. It is possible if the road have sufficient cross slope about 2% and free from depressions, potholes and cracks otherwise water will enter into the road structure. Subsurface drainage is collection of that water that has entered into the road structure. This internal drainage function of a road pavement is usually performed by the GSB (Granular Sub Base, consisting grave and sand mixed in defined proportion) layer. This layer itself must be drained in some way. It is also must to keep the water-table low to prevent the moisture content of the subgrade increasing through capillary action., and hence decreasing the subgrade strength. the subgrade strength is measured by the C.B.R. (California Bearing Ratio measured in % age) value, the pavement design is based upon it. C.B.R. value of soils decreases with increase in moisture content as shown in the Fig. 1. to keep the moisture content low proper drainage of subgrade and sealing of the crust (to stop ingress of water) is must. Also the road pavement itself must be constructed so that it will drain in the event of a failure of the integrity of the surfacing layers, i.e. if water is able to enter the road pavement there must be a path for it to exit.

### Failure Mechanism:



**Bearing failure (Loss of C.B.R.):** Once water has entered a road pavement, water damage is initially caused by hydraulic pressure, i.e. vehicles passing over the road pavement pass on considerable sudden pressure on the water present in the road pavement, this pressure forces the water further into the road structure and breaks it up, this process can be very rapid once it begins. Sooner or later the water will descend to the subgrade layer below the road pavement and weaken this layer thus lowering the C.B.R. of the subgrade, and complex failure of the road will begin.

**Binding Failure (Stripping of Aggregates):** Most aggregates have a greater affinity for water than bitumen, and with the presence of water and movement of the aggregate it is quite possible for the binder film on the aggregate particle to be broken and water to come in to contact with the aggregate surface. Once the integrity of the binder layer has been broken it will depend upon the nature of the aggregates, viscosity and thickness of bitumen layer as to how long it will be before stripping of the aggregates.

The layers making up the road pavement have failed for various reasons, but one of the most common is poor drainage, either by :-

- a) inadequate drainage provision in the original road pavement design,
- b) Lack of maintenance of the drainage so that it no longer functions in a correct manner.
- c) Rise in water table thus weakening the road pavement,
- d) Failure of the impervious nature of the surface course such as thin layers of premix carpet without proper sealing coat, cracks and potholes and undulations causing pooling, thus allowing the passage of surface water in to the road pavement matrix.

Daljeet Sidhu

E-mail [daljitsidhu@hotmail.com](mailto:daljitsidhu@hotmail.com)