

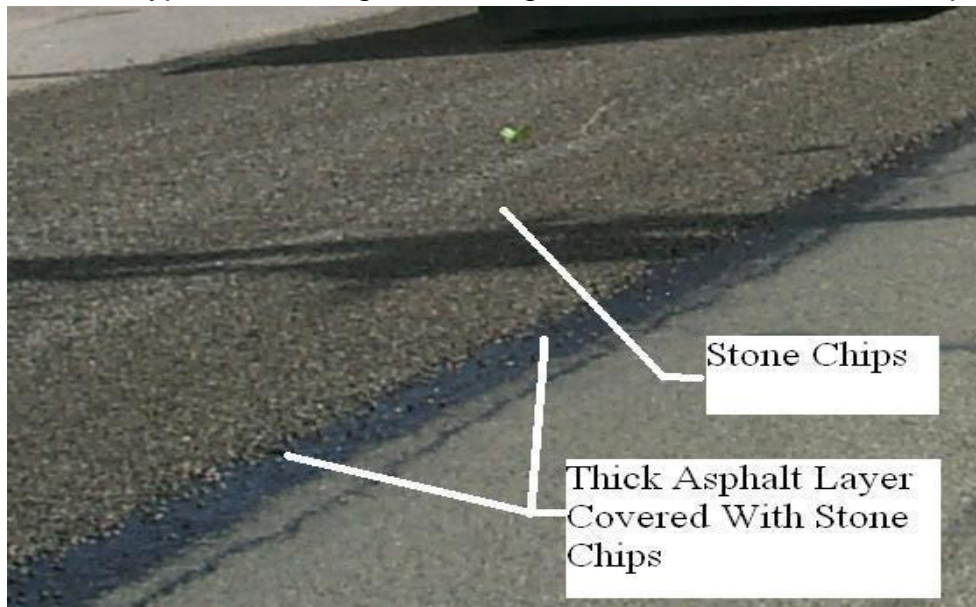
Seal Coat – A Tonic for Weathered Road Surfacing

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All bituminous surfacing change with time in one way or another under the action of weather and traffic. The consistency of the binder changes with temperature, becoming softer in warm weather and harder in cold weather; the exposed binder also hardens continually as a result of atmospheric influence. The whole complex of changes under these influences is called **weathering**. Some changes occur no matter how carefully the and controls the properties of his materials and their proportions in the mix design. The degree and the effect of the changes on the road surfacing vary with its type, particularly with the extent to which the bituminous binder is exposed to the action of weathering agents. Weathering changes the chemical composition of bitumen. It becomes hard and brittle due to:

- i) Evaporation of more volatile components.
- ii) Chemical action of atmospheric oxygen.
- iii) Age hardening, in which the internal physical structure of the binder changes with time.
- iv) Polymerization, involving chemical changes in the material.

In surface dressings the binder film is relatively thick ,Fig-1(of the order of 1 mm) and is protected to some extent from the action of weather by the stone chippings which covers it. In this type of surfacing weathering of the binder is not of first importance.



Cover of Stone Chips acts as Weather Protection
Cover for Asphalt/Bitumen Layer

fig-1

With dense surfacing material such as rolled asphalt, dense tar surfacing and mastic asphalt, materials which conform to the appropriate Standard specification have a low voids content (less than 8 per cent) and are almost completely impermeable to air and water. It follows that with these materials weathering agents have little effect on the material in the body of the surfacing and durability is consequently very high.



Dense Bitumenous Mix- Very Little Exposed to Weathering

fig-2

In new thin layer of premix with bitumen contents less than 3.5% (Fig-3), that contains air voids in the range of 20% - 25% causes free circulation of air sunlight and rain water, **thus problem of weathering is very swear**, The expected life of such surfacing is very short, it hardly withstand any rain. In an old, weathered surfacing that has become brittle with age, the particles of aggregates remain in their position for very short period (Fig-4). Timely and right application of seal coat can add new lease of life to the surfacing layer too. The cost of seal coat is about 10% of premix carpet layer, it also saves from ill-effects of raising of road level, reduces the need of mining and transportation operations of natural mineral. Reduced road closing hours for repair.



Less Dense Bitumenous Mix, Vulnerable to weathering due to accumulation Accumulation of Water, Free Access to Sun Light and Air .

Fig-3



Fully Weathered Old Surfacing On the Verge to Break

Fig-4

Depending upon the condition of road surface, climatic and traffic conditions any one of the following seal coat technique can be used.

Fog Seal

A fog seal is an application of bitumen emulsion sprayed on a road surface with or without a sand cover. The emulsion is diluted to the proper consistency in order to get complete coverage on the roadway but not be too thick to cause a slippery surface. A fog seal works better on a coarse aggregate surface where the bitumen emulsion has room to pond between the aggregate particles. On a smooth aggregate surface, the asphalt rests on the surface covering the top of aggregate particles, creating a slippery surface for the vehicles. If the fog seal was not properly applied and a slippery surface exists, a dry clean-sand cover is applied to the surface.

Sand Seal

A sand seal is a sprayed application of asphalt emulsion followed by a covering of clean sand or fine aggregate. A pneumatic-tire roller is often used after applying the sand. Excess sand is removed from the road surface after rolling. Sand seals enrich weathered pavements and fills fine cracks in the pavement surface. The sand can provide additional skid resistance to the pavement.

Scrub Seal

The scrub seal process drags a brooming mechanism over the road surface after the asphalt emulsion has been applied to fill the pavement cracks and voids. A layer of sand or aggregate is applied over the emulsion followed by another drag broom, forcing the sand into the emulsion filled cracks and voids. A pneumatic tire roller is then used over the seal. The excess sand or aggregate is broomed off the roadway a couple of hours after application depending on weather conditions.

Chip Seal

Chip seals are the most common surface treatment for low-volume roads. A chip seal is an application of asphalt followed by an aggregate cover. The asphalt is usually applied as a hot bitumen, cutback asphalt, or emulsified asphalt. After the hot asphalt binder, cutback asphalt, or asphalt emulsion is applied to the pavement surface, aggregate is immediately applied over the asphalt before the hot asphalt binder cools or the asphalt emulsion breaks. A pneumatic roller is used to reorient or seat the aggregate particles and tighten the stone chips. After the asphalt cures, the excess aggregate is removed by brooming

Slurry Seal

A slurry seal is a mixture of quick setting asphalt emulsion, fine aggregate, mineral filler, additive, and water. The ingredients are carefully measured and combined on the project site and spread with a squeegee device. In small areas and parking lots, a hand squeegee is commonly used to spread the mixture.

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