

# WATERING THE INDIAN ROADS

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**Abstract** - Bituminous roads are the most important means of transportation in India and carry the bulk of the heavily and lightly loaded vehicles. Since every year thousands of crores rupees are spent on bituminous constructions it becomes extremely important to prepare and maintain such flexible pavements so that they remain strong and durable for long time. One of the major causes of damage to the bituminous construction is presence of water. Presence of water causes the binder bitumen to strip off the aggregate surface and thereby cause disintegration of the pavement surface. Except rainfall there are various means, which causes the pavement to come in touch of water, and one such factor is human influence. And the only way to stop such influence is to create widespread awareness amongst the people and thereby save large amount of time, money and resources.

**Key Words:** bituminous construction, stripping, human influence, awareness, money

## 1. INTRODUCTION

Transportation is the backbone of socio - economic development of any country in the world and therefore for India also. Transportation can be through air, water (rivers and seas) and land (rails and roads). Amongst all the means of transportation the roadways give the maximum service to one and all. All the other means of transportation depend on the transportation by roads to fulfill their purposes completely. The roads carry various types of heavily and lightly loaded vehicles like trucks, buses, cars and others over their surfaces and it is therefore extremely important to prepare and maintain a road surface i.e. the pavement which should be stable and non - yielding. Based on the structural behavior pavements are classified into two categories i.e. flexible pavements and rigid pavements. Since the major portions of the roadways are flexible pavements it is very much important to prepare and maintain such surfaces so that they remain strong and durable for long time. Atypical flexible pavement structure consists of layers of soil sub grade, sub - base course, base course and surfacing and these four layers laid in total or in some combination are required to transfer the traffic load to the underlying soil through the different layers safely throughout their life. The surfacing being the topmost layer is the most important and vital layer in the pavement structure and it has to be the strongest as the highest compressive stresses are to be sustained by this layer in addition to the wear and tear due to the traffic. This surface layer also provides water - tight layer against the surface water infiltration to the lower layers. Once the surfacing is broken other layers disintegrate

very easily and quickly. The major constituents of this surfacing or the wearing course are aggregates (broken stones) and binder material (bitumen and tar).

## 2. BITUMEN AS BINDER

Bitumen is the oldest engineering material used by the mankind and has been in use since 6000 BC. Bitumen has a very good waterproofing and adhesive properties. In flexible pavement construction the surfacing consists of bituminous layers where the bitumen acts as a binder to bind together the aggregates to form a compact and smooth layer. The bitumen used for such purposes is called paving bitumen and is the most expensive and most important ingredient in bituminous road construction. Bitumen is a complex organic material (hydrocarbon) and occurs either naturally or may be obtained artificially during distillation of petroleum crude. Bitumen adheres well to all normal types of road aggregates and is usually mixed with the aggregates at a high temperature of usually about 140 - 170 degree centigrade. Aggregates found in nature are electrically charged and are either electronegative (hydrophilic) or electropositive (hydrophobic). Although, the process of binding of bitumen with aggregates is mainly controlled by the viscosity of the binder. The polar activity of the aggregates comes to effect when the permeable bituminous mix comes to the contact of water. Some aggregates, due to their greater affinity towards water, bonds with water due to the physico - chemical forces acting on the system and leaves the bitumen binder loose. This phenomenon is called stripping of binder and is the main reason for the damage of the bituminous road surfaces. Although, there are various reasons for the damage of bituminous pavements like fatigue cracking, thermal cracking, spalling, rutting, scaling etc, the stripping is a major form of pavement disintegration in India.

## 3. DAMAGE DUE TO WATERING

Every year thousands of kilometers of roadways are constructed and repaired using bituminous mixes and for such purpose thousands of crores of rupees are spent. It is therefore extremely important that these roadways serve their purposes without much damage to their surfaces. The major causes of damages to the bituminous surfaces are heavy axle load, load reversals, thermal stresses, aging and water-induced damage like stripping. The bituminous surfaces having small thickness and less binder contents are more susceptible to such water - induced damages. Water logging due to rains, faulty construction of the surface layer, absence/insufficient drainage facilities cause water to seep into the bituminous layer resulting into disintegration of aggregate and bitumen binder. Except these there is another

factor that cause the water - induced damage to the bituminous layer and that is human factor. The roadways pass through various localities (small towns and cities) and these localities usually are the market areas of the regions besides some residential areas. These market areas usually do not have adequate drainage facilities and water logging becomes eminent. Besides people in so many places can be found to keep the road surface wet by watering them to prevent their shops and residences from getting dusted. In doing so they water the roads quite frequently and thereby initiate the damage of the road surface. Soon the stripping process starts and area is found to be consisting of numerous potholes and waterlogged. A few pictures of such incidences are given here which explains the situations.



(c)



(d)



(a)



(b)

Fig. 1 (a, b, c, d) – Human influence in watering of bituminous surfaces

The pictures given in Fig 1 clearly shows that people are watering the road stretches deliberately and thereby creating water logging and it is quite obvious that such situations occur regularly. Clearly these and several other

similar situations occur due to the ignorance of the fact that such watering causes damage to the road surface, specially those of small thickness and less binder content, by stripping and thereby crores of rupees spent in road construction gets wasted. The road surfaces thus damaged then get repaired and again watering takes place. This cycle of damaging the road surface and its repair continues and so much effort and money simply gets wasted. It is therefore extremely important to stop occurrences of such incidences and the primary way to prevent that is to create awareness amongst the people about the harmful effects of such watering on the pavement and the economy. A sincere and timely effort to create awareness amongst the users can only save wastage of so much of time, money and resources.

### 3. CONCLUSIONS

Bituminous pavement surfaces get damaged due to the presence of water as water causes the bitumen binder to strip off the aggregate surfaces. Amongst the various possible ways by which water comes into contact with the bituminous surface on is the human influence. Common people water the roads, usually regularly, in order to get rid off the dust. And by doing so, unknowingly, causes damage to the bituminous construction. This results into wastage of lots of money and other resources and therefore causes harm to the economy of the country. An effective way to stop such occurrences is to create awareness amongst the common people about the harmful effect of such practices.

### REFERENCES

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### BIOGRAPHIES



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