
A REVIEW ON DESIGN SELF CLEANING ROAD

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ABSTRACT

Now a days there is increasing concern in transportation engineering about the use of techniques less harmful to the environment and also about road safety. Pavement cleaning and maintenance is a necessity in today's cities and towns. In India there are many Highways, Major states roads and other district road which is the main appearance of India but these streets are covered with filthy material and wastage. Maintenance of a road network involves a variety of operations, i.e., identification of deficiencies and planning, programming and scheduling for actual implementation in the field and monitoring. The essential objective should be to keep the road surface and appurtenances in good condition and to extend the life of the road asset to its design life. This article reviews the research published on self-cleaning concrete roads and bituminous roads and presents its role in reducing environmental pollution and its place in future engineering studies. When we look at the studies on self-cleaning concrete that emerged as a result of the developments in concrete technology, it is seen that the developments have progressed considerably. Environmentally friendly building materials will fulfill their duty in reducing air pollution, one of the biggest problems of our time. Self-cleaning buildings and roads that reduce pollution may sound like futuristic ideas, but it is not far away to encounter these structures more widely in our country and our world. In this project studied Wardha district, Maharashtra street roads. As consider Wanjari sq. to Shastri sq. road and Shastri sq. to the Bajaj sq. road this having bitumen and concrete respectively, for self-cleaning of road we have to install nozzles in center line of road, this nozzles are moves up and down as required. Nozzles spread out water at a design discharge and clean the road and after cleaning remove this waste water towards the drainage line which are useful for reused of water for the same process.

Keywords-Self Cleaning Road, Bituminous Roads, Concrete Roads, Nozzles and Drainage.

I. INTRODUCTION

1.1 Background of the study

In India, two types of roads are mainly constructed, namely asphalt roads (bituminous) and concrete roads. Asphalt roads are cheaper to build than concrete roads. Bitumen has a relatively low bearing capacity of One of the main reasons is temperature changes. In India, the temperature varies with different time periods, even high in the afternoon and low at night. Concrete roads failed mainly due to cracking. Road pavements must be able to withstand the effects promoted by vehicle traffic and also by the climate actions (weathering), ensuring driving conditions meet requirements related to safety, comfort, economy, and with low environmental impact on the surrounding ecosystems. Most recent research on road pavements is intended to improve the mechanical behavior of asphalt mixtures, but recently the functionalization and multifunctional capabilities have become an important topic. The pavement failure may occur due to various factors such as excessive vehicular stress, sunlight exposure, water intrusion, unequal expansion and contraction due to seasonal changes, etc.

2.2 Problem Statement

Different countries have different weather conditions. In some regions there is heavy rainfall and snowfall whereas somewhere there is very slow and less quantity of rainfall. In India rainfall is varies according to different region like in state of Rajasthan there is less amount of rainfall and in Maharashtra more quantity of rainfall occurs whereas in Jammu and Kashmir instead of rainfall amount of snow fall is more. According to the condition the shape of road is decided. In other countries like America, Japan, China the road which is constructed have flat surface because there is adequate rainfall occurs so there is no problem of drainage

overflow occurs. But in India the rainfall data changes with times. Sometimes there is too heavy rain whereas sometimes there is drought. So, when there are heavy rainfall drainage problems occurs. For the proper drain out of water the roads are constructed with slightly curved surface than the flat ones.

Pavement cracking is the complex phenomena that can caused by temperature variation and load f vehicle. Athigh temperatures the viscous component dominates and total stress relaxation takes few minutes.

Pavement cracking takes several forms which is discuss below-

1. Longitudinal cracking, occurring generally in the wheel path.
2. Transverse cracking, that can be in any lane.
3. Alligator and crocodile cracking, where longitudinal and transverse cracking get together and forming network of cracks.

2.3 Objectives

1. Self-cleaning road by atomization over bitumen and concrete road.
2. To reuse the treated water from the sewage treatment plant and after cleaning of road.

2.4 Materials

1)Water Pump

1. Water pump increases low water pressure and flow .
2. It provides the extra power needed to bring your water to the desired level.
3. A water pump provides pressure to move water from a storage tank to roads through pipes.

2)Cast Iron Pipe

1. Cast iron pipe is pipe made predominantly from gray cast iron It was historically used as a pressure pipe for transmission of water , gas and sewage
2. Cast Iron pipe is widely used for city water - distribution systems because its high resistance to corrosion and consequent long life .
3. These pipes are made with 20-30 cm in diameter, length of a pipe section is 12 ft. and long life of about 100 years .
4. The motor works by solar energy .
5. When the motor is turned on , The water goes straight through the pipe from the gravity tank and flow through the cast iron pipes provided on the road .
6. The nozzle is provided at the cast iron pipe .
7. The sprinkler produces water jets and sprinkles through the stud.

3)Nozzle

II. LITERATURE REVIEW

[1] Automatic Cleaning of Road ByVinayKrishna (2021)

Self-cleaning of road is that to reduce the dust and temperature to maintain the roads atmosphere. In this project fixing two types of sensors which are dust sensor and temperature sensor. When temperature will increase, the temperature sensor will active and then water will spray through the nozzle and the same function to the dust sensor. When the dust is increasing the dust sensor will active and water will spray through the nozzle. The circular nozzle connected to spray water at sensible times. Then the water from pipeline connected with a solenoidal valve to nozzle for spraying water. So the connection completed and it will work.

[2] Self Cleaning and Maintaining of Road By Dileep Singhet.al (2022)

The cleaning and maintenance of the street pavements is the necessity of the town andcities now a days. Ifthe people stand with the current maintenance process, It will only widen and deepen the crisis. There any many harmful substances which affect human as well as environment and makes street nasty. It gives bad impact on the lower part of vehicles such as vehicles engines and plastic wastage can be causes of slip the vehicles, Which takes place of minor and major accidents. The durability of the pavement is broadly depend on the temperature variation. The change in temperature develops unwanted stresses in the pavement, Which leads to the crack

formation. Removing and controlling of these type of problems is the challenging task. The process is to make clean the pavement by water and air pressure and prevention of road surface by temperature variation. In India mostly two types of roads are constructed bituminous and concrete roads. Bituminous roads are Cheap to construct compare to concrete roads. The load carrying capacity of Bituminous is less comparatively. There are potholes appears on bituminous road quickly because of various reasons. One of the major reasons for it is variation in temperature.

[3] Design Of Self Cleaning Road By Borhade Navnath Shivajiet.al (2021)

There are lots of reasons for death of human being. The major cause is due to accidents. Accidents can be of many types like earthquake, tsunami etc. The accidents cause by natural calamities is not in our control. The amount of road accidents is more comparative to other ones. India is country where the death rate due to road accidents is more. In future, lots of highways will be constructing in India. In India temperature changes rapidly which causes cracks to roads leading to failure of road. These problems are solved out by following remedy. By watering the road every day and by spraying air on it, the road can be reuse within few hours. This is easy and quick method of watering of road.

[4] Review Paper on Self Cleaning Roads with Road Stud By Prof. Om Vaidya (2018)

In this report the road washing is done with the help of water spraying nozzles which are installed in the ROAD STUD (Rs.40/piece). Road studs are used as road reflectors. The price of the road reflectors i.e. road studs is very less. The road studs are available in various shapes and sizes. According to that its price varies. Recently the solar road studs are also invented. Along with that we required spraying water nozzles.

[5] Automatic Street Cleaning and Pavement Treatment Process By Shubham Upadhyay et.al (2017)

The cleaning and maintenance of the street pavements is the necessity of the town and cities now a days. If the peoples stand with the current maintenance process, It will only widen and deepen the crisis. There any many harmful substances which affect human as well as environment and makes street nasty. It gives bad impact on the lower part of vehicles such as vehicle engine sand plastic wastage can be causes of slip the vehicles, Which takes place of minor and major accidents. The durability of the pavement is broadly depend on the temperature variation. The change in temperature develops unwanted stresses in the pavement, Which leads to the crack formation. Removing and controlling of these type of problems is the challenging task. The process is to make clean the pavement by water and air pressure and prevention of road surface by temper.

III. PROPOSED METHODOLOGY

The methodology is carried out in the following steps:

1. Selection of site.
2. Determining the stretch going to be designed.
3. Allocating location for central main pipe.
4. Design of discharge required.
5. Design of central main pipe.
6. Design of nozzles.

Study Area: In Wardha District, Maharashtra, India



1. Wanjarisq. toshastrisq.- Bituminous road (900 m)
Shastrisq. To Bajajsq.- Concrete road (600m)

IV. CONCLUSION

The smart road and development (R&D) research is to develop safer and more convenient highways by means converging the highly advance road technologies. Smart highway project is composed with the road technology part. The ministry of road transport and highway spent the amount of Rs 600 cr. for road safety and cleaning purpose. During the year 2015-2016 and 2016-2017, but this process is slow to reduce the problem and temperature variation is also effect the road pavement which reason of vehicle maintenance and failure of the vehicle part.

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