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Self Cleaning Road with Power Generation & 3R (Recycle Reuse Restore) of Water

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ABSTRACT: The main purpose of this project is maintaining the cleanness of Highway and make it Strong durable and smarter. There are lots of reasons for death of human being. The major cause is due to accidents. 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 roadway. These problems are solved out by following remedy. By watering the road every day, the road can be reuse within sometime. This is easy and quick method of watering of road for the daily watering of road one more challenging task is shortage of water, for this task we have a solution as using the water by 3R principle as Recycle, Reuse, Restore.

The purpose of this study was to evaluate the possible causes of pavement failures and to recommend remedies to minimize failures of the roadway and dust reduction. The paper describes lessons learnt from pavement failures and problems experienced during the last few years on a number of projects in India. Based on the past experience's various pavement preservation techniques and measures are also discussed which will be helpful in increasing the serviceable life of roadway. The revolution in the automobile industry and liberalized economy has led to tremendous increase in the vehicle ownership levels. This has resulted in changing traffic characteristics on road network. In this paper an attempt has been made to analyze the changing traffic composition trends, speed characteristics and travel patterns by taking few case studies. Further, the impact of changing traffic composition trends and emerging issues thereof are discussed. The main objective of this design is to facilitate the clean highways, convenience, comfort, safety of people travelling and generating power through the roadway transportation by enhancing the efficient movement of road users and minimize the pollution due to humidity on the road surface. The urban roads in India generally cater to heterogeneous motorized traffic, along with slow-moving traffic including pedestrians. A proper traffic model must consider varying characteristics of all the road user to effectively design and efficiently manage signalizedintersections.

KEYWORDS: Self-Cleaning Roads, Power Generation, 3R (Recycle, Reuse, Restore) for Water use.

I. INTRODUCTION

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. In India temperature varies with different time span even high temperature in afternoon and low at night. Concrete roads are fails mainly because of cracks. Cracks appear due same reason as mentioned above. Another problem observed on concrete road is that, we cannot drive our vehicle fast on it. Because when this concrete roads are hot and when we drive our vehicle fast on it the friction is developed in concrete and vehicle's tier which leads failure of tier. So the cracks lead to failure of roads and friction in concrete leads to accidents. So, the problem is temperature changes observed on the road. To, avoid this problem spraying water is best solution on it. The water can be sprayed on water manually or by using different machines. Different machines are fitted in vehicles and spraying of water is done. Our solution for this kind of problem is that we provided water cleaning system inside the road divider. The cleaning system will be hidden in the divider so that there will not much difficulty for drivers in day or night. The outlets of the cleaning system is installed exactly at equal distance from each other so that it can cover larger surface of the road way. When water is supplied from the cleaning system it will delivery the water from the out lets which are installed inside the divider then the water which is used clean the road surface is collected by the end of the road through the drainage and also stored in the tanks which are constructed under the road pavement Similar project is applied in South Korea but it is observed that there are patches appear where no water is reached . These problems are eliminated in our

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design. The pipes can be provided inside the dividers. Pipes will provide water . This concept can be used for smaller length of road and if possible it can be used to longer distance also. Road maintenance is one of the important of the entire road system. The maintenance operations involve the assessment of road condition, diagnosis of the problem and adopting the most appropriate maintenance steps. Even if the highways are well designed and constructed, they may require maintenance; the extent of which will depend on several factors including the pavement type. Various types of failures in pavement ranging from minor and localised failure to major and general failure do take place on roads. The failures may be due to one or a combination of several causes.

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 assets to its design life. Broadly, the activities include identification of defects and the possible cause there off, determination of appropriate remedial measures; implement these in the field and monitoring of the results. This will involve several subsystems of identification, evaluation, planning, scheduling, management of men, material and machinery and then performance evaluation. The objectives of the study are as follows:

1) To identify type and classification of common defects in flexible pavements.

2) To identify the causes of these defects and suggest remedial measures.

3) To identify the defects in existing pavement maintenance practices .

4) To rectify the identified defects for smooth movement of traffic flow.

5) To generate electric power using solar panel .

6) Use of water with 3R principle.

Objective

1) To decrease the dust nuisance from road surface.

2) To reduce the development of cracks on roads.

3) To increase the durability of the road.

4) To decrease the death rate by minimizing the accidents

5) To reuse the treated water which is used by the cleaning system .

6) To reduce the dust from road way

7) To generate electricity Using solar panel.

II. METHODOLOGY

In advanced cleaning system we have set the pipelines hidden well in the dividers between the roadway the main pipeline located at lower most portion on the divider. Mini-pipes are connected to the main pipeline those mini-pipelines are coming out of the divider at the lower part of it, and drainage holes are giving on the both end side of the pavement. Drainage whole servers the purpose of collecting the remaining amount of water which are released from the mini-pipes. The drainage holes are internally connected with each other leading to the storage tank which is located underground which restores the excess amount of water to be collected

When the system is activated and water is released from the tubes for the purpose of cleaning the roadway, taking out the toxic material from the pavement surface after it the excess/impure/waste water is passed through “Slow Sand Filter” which is located right under the drainage line for the filtration process. Filtered Water is collected in the tank. After all of this process as a resultant we reduce the pavement damage by maintaining the temperature of the pavement, we reduce the dust and toxic material from roadway surface

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We also have placed solar panels for the generation of electricity. Solar panels are installed on the street poles in the center and for highway project solar panels are installed on the straight pole, either of it They are placed in the middle of the dividers at a certain height so that the solar panel can give maximum out put

A) Materials

A. Material required for making model of pavement: -

1. Plywood – 5 x 4 ft.
2. Metal Screw – 50 nos.
3. Fevicol/ gum (for better connection)
4. Hammer
5. Drill Machine
6. Circular saw (to cut the plywood
7. Paint (Black, white, and yellow)
8. Scale, Pencil, Brush- 2 nos.

B. Material used to provide solar system in model.

1. Steel pipe with 10mm & 6 ft. long. (Hollow)

2. steel rods with 4mm dia.

3. As welding rod & welding machine.

4. led bulbs of mini size.

5. Wire. Tape. Flasher [Led, Panel, Driver)

6. solar panel sticker 7. card sheet.

C• Material required for providing / installation of Architectural road cleaning system:

1.PVC pipes

2.2-inch dia. And 4.5 ft. length. 2. 8 mm dia. Tube.

3. Feviquick – 3 nos.

4. Cutter

5. Tape & scale

6. Closer and L Shape Pipe

7. Cement, Sand and Dust.

8. Architectural Trees, etc.

Experimental Analysis of Working Model

1] Testing of pavement Cleaning System :-

We analysis and performed a testing of self cleaning system which is provided in roadway devider in this testing we used raw water in college by electric water in college. By electric water pump for inlet of water which is provided to cleaning water process the water is spread through the valve provided in road devider on the pavement structure is cleaned system worked as we expected.

2] Collection of used water through the drainage system :-

The water which is used for cleaning purpose is stored/restored through the slope and drainage system which is provided at the road boundries and stored for recycle process.

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3] Filtration of drainage water :-

For the recycle and filtration of water we provided the slow sand filter system. In this type of filtration method the water is filtered without electric power and man power. By using providing layer of sand with sieved sand in proper manner below the drainage. The inlet for drain water is provided at the top of storage tank and filtration system and outlet for reusable water are used through the pump outlet.

The 3R principal of water (Restore, Recycle and Reuse) was successful with the use of slow sand filter.

III. LITERATURE REVIEW

The study of the scientific basis of street cleaning activities as road dust mitigation measure road dust emission causes health problems due to increase in PM concentrations and other carbonaceous compounds. This document is aimed to gather all available and relevant information, and divulgate them among relevant stakeholders. The road cleaning machine can be used for cleaning the long distances and wide width reduces the human effort, so that the cleaning can be done in a single drive. It is seen at present that a human pushing machines and cleaning is doing with human effort, and it is always to be done when roads are operated without traffic. This system is very costly and to make less effort and very efficient system and also not possible because of due to large loads, with running traffic. This study shows that 250 GMS fine dust objects can be collected from roads with high efficiency. Basically, the city does quite well in terms of the environment. The two main streams, when it comes to street cleaning, are both handled with thought.

A project of title with a literature study on the cleaning of streets in Stockholm city. Swedan is a county with winter roads which makes it necessary for us to use winter tires for traffic safety. This is one two big matters causing street dust. It is very useful for cleaning the wet as well as dry roads. In modern days interior decorations are becoming an important in our life cleaning roads is very important for our health and this roads cleaning machine reduces the efforts required for cleaning. So this project is very useful in our daily life. It is very simple in construction and easy to operate, anyone can operate this machine easily. This road cleaner includes a damp cotton swab, brush, wiper and a vacuum cleaner to reduce cleaning time. The overall price of this machine is also cheap. This type of machine is widely used for this purpose, but they work on different principles and the cost is very high. In recent years, road cleaners have become more and more popular for cleaning large areas in minimal time. However, in India, a developing country, a large number of such machines are needed to meet the cleaning needs.

IV. DISCUSSION

Concrete technology is subject to continuous development and improvement. One of the most recent contributions to concrete's strength and durability is its ability to self-clean. This effect is achieved by applying a photocatalyst material to the concrete mix. This article describes the effect of self-cleaning and air purification [3]. For about ten years, concrete pavers with this function have been available. With the development of the test setup and the use of nitric oxide (NO) as a sample pollutant, a method was found to quantitatively evaluate the air cleaning ability of these pavers. This seems interesting as there is no actual comparative analysis of air filter concrete products and the establishment of measurement standards for concrete products is still in draft form. A brief technical description of this experimental setup will be presented to the reader. Using this innovative setup, the effects on decomposition efficiency are investigated and a basic response model is provided.

There are many reasons that lead to human death. The main cause was an accident. Accidents can fall into several categories like earthquake, tsunami, etc. Accidents caused by natural disasters are not under our control. The number of road accidents is more than others. India has the highest rate of road accident deaths. In the future, more highways will be built in India. In India, the temperature is changing rapidly causing cracks in the roads leading tom failure of road [4]. 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.
Self-cleaning of the streets using treated wastewater from electric poles. The document offers solutions to road washing problems. This technique is used in Korea, but it can also be used in India. The document describes in detail all the

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advantages of this technique. Road wash is good for its aesthetics and durability. So for maintaining road wash works, road rivet can be very useful at the divider preventing it from breaking from vehicles due to its advantages in use.

The purpose of this project is to clean up roads in colleges, hospitals, auditoriums, shopping malls and workshops. The goal of this project was to design and develop a road cleaning process. It is useful to clean the road and ground. Nowadays, interior decoration becomes important in our life. Road cleaning is very important for our health and road cleaners reduce the effort required for cleaning. This project is therefore very useful in our daily lives [5]. It is very simple in structure and easy to operate and a little cheap, anyone can use this machine easily. The road cleaner includes a brush and a cleaning time reducer.

V. CONCLUSION

The Self-cleaning of road project finding a solution of a problem in road and street. In this project install the automatic cleaning system on road to maintain temperature and to reduce pavement failure and the system to create clean roads and attractive environment also generation of the electric power. Self-cleaning water wash gives a broad impact of cleaning and maintenance process of road. The overall cost of this machine is also economical. Such type of system can be widely used for this purpose but they are working under different principles and the cost is very high. In recent years, floor cleaning machines are getting more popular for cleaning large area in minimum time. However in India, which is a developing country requires large type of such machinesto satisfy the cleaning needs.

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