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## “Application of Use of Plastic Waste in Flexible in Road Construction - A current scenario”

Param A Dudhatra, M. TECH STUDENT, DEPARTMENT OF CIVIL ENGINEERING, PIET, PARUL UNIVERSITY.

JAYSHIV THAKKAR, ASSISTANT PROFESSOR, DEPARTMENT OF CIVIL ENGINEERING, PIET, PARUL UNIVERSITY.

TEJAS PANDYA, PH. D. SCHOLAR, DEPARTMENT OF CIVIL ENGINEERING, PIET, PARUL UNIVERSITY.

*Abstract:* In this paper appearance, the learning of plastic waste such as plastic bags, bottles, etc. which are a vast problem for the community that can be reuse by certain procedures. The waste can be used in the making of road. The road creation with the plastic waste response a high tensile strength which is more required in the road development. By the use of plastic waste the roads are stronger with rise of Marshall Stability value. The presentation will firm to the alertness among the reuse of plastic waste, ecological situations and to withstand with the step. Plastic waste can rise strength by 100% and has no effect of radiation like ultraviolet rays. The study includes the tests performed to achieve the better resistance towards rain water, water stagnation, load withstanding, strength, maintenance cost, binding property etc.

*Index Terms* Waste Plastic, Bitumen, Aggregate.

### I. INTRODUCTION

- According to press information In India produces 62 million tons of waste every year. And Per day production 1,88,000 tons. In particular Gujarat produces 8,336 metric tons of solid waste per day. Now a day's plastic is everywhere, it used for packaging, protecting, and even disposing of all kinds of consumer goods. Plastic is a non-biodegradable material and analyzer found that the material can remain on earth for 4500 years without degradation.
- The plastic waste such as carry bags, cups, polythene, polyethylene (PE), polypropylene (PP) polystyrene (PS) High Density polyethylene (HDPE) etc. up to 60 $\mu$  thickness can be used in construction plastic roads. PVC sheets can not be used. The plastic waste is first of all introduced to the various basic processes like segregation, cleaning, shredding and collection. After the collection of shredded plastic, it is mixed in the road materials (i.e. bitumen and aggregates) for the construction of plastic road. There are two methods of mixing plastic to the road materials, first is dry method and second is wet method. Both the methods are done differently. In India dry method is generally used. The plastic waste management as road construction is a better way of reusing the plastic as there is a lot of plastic waste generated every day. Moreover this technique is more economic as well as more efficient. The plastic roads give better quality and properties of road than normal bitumen roads.

## 1. Literature review:

- Plastic roads are such as a new idea, creation processes may vary. roads are made from the mix of plastic and bitumen. Roads are developed from recycled plastics, and the first step in constructing them into collect and manage plastic material.
- Dr. S. L. Hake According to him the optimum bitumen content of the semi dense bituminous concrete mixes showed 10% higher when compared with modified semi dense bituminous concrete mixes with waste plastic.
- Shweta N. Rokdey According to her This innovative technology not only strengthened the road construction but also increased the road life. And Rokdey were using of dry mix process. they could achieve durability of the roads laid out with shredded plastic waste is much more compared with roads with asphalt with the ordinary mix
- Mohd Ezree Abdullah says using of binding techniques and mixing of waste plastic and bitumen mix at temperature 170 °C to 175 °C and mixer at 1200-1500 rpm for 1 hour. Moreover, plastic waste improves the performance of bitumen when it was added into bitumen. The higher plastic waste percentage give the higher strength.
- P Priya et. al. presented that in the world plastic waste is the threat to the environment in current scenario. As the plastic is not eco-friendly as they are not bio-degradable. They presented that partial replacement of bitumen by polymer (plastic) waste in bituminous mix with marble chips as aggregate and comparative study is done. They used different percentage of plastic proportion of 5, 10 and 15% plastic and determine various aspects such as stability and void contents. Plastic road would be boon for India's hot and extremely humid climate, where temperature frequently cross 50°C. The comparative study is done by them with different percentage of plastic and marble chips usage. Finally, they concluded that the in flexible pavement with polymer bitumen in various proportion the stability of marble chips in plastic pavement gives considerably good results than conventional plastic pavement up to 10%. After that plastic pavement gives better stability than marble aggregate plastic pavement.

## 2. Issues:

- While burning PVC plastics, harmful toxic gases like hydrochloric acid are formed and when other plastics like PP and PS are burned gases like carbon monoxide, acrolein, formic acid, and ethylbenzene are formed which are very dangerous to human health and to the ozone layer.
- Researchers, even Dr. A. Vasudevan have found that only Polypropylene(PP), Polystyrene(PS), and polyethylene(PE) can be used for the making of plastic road, but polyvinyl chloride(PVC) can not used for making these kinds of roads. PVC plastics are found abundantly in the market and its hard to distinguish between PP, PE, PS, and PVC. We should be careful while selecting the plastic.
- During the road laying process- the presence of chlorine will release noxious HCL gas.

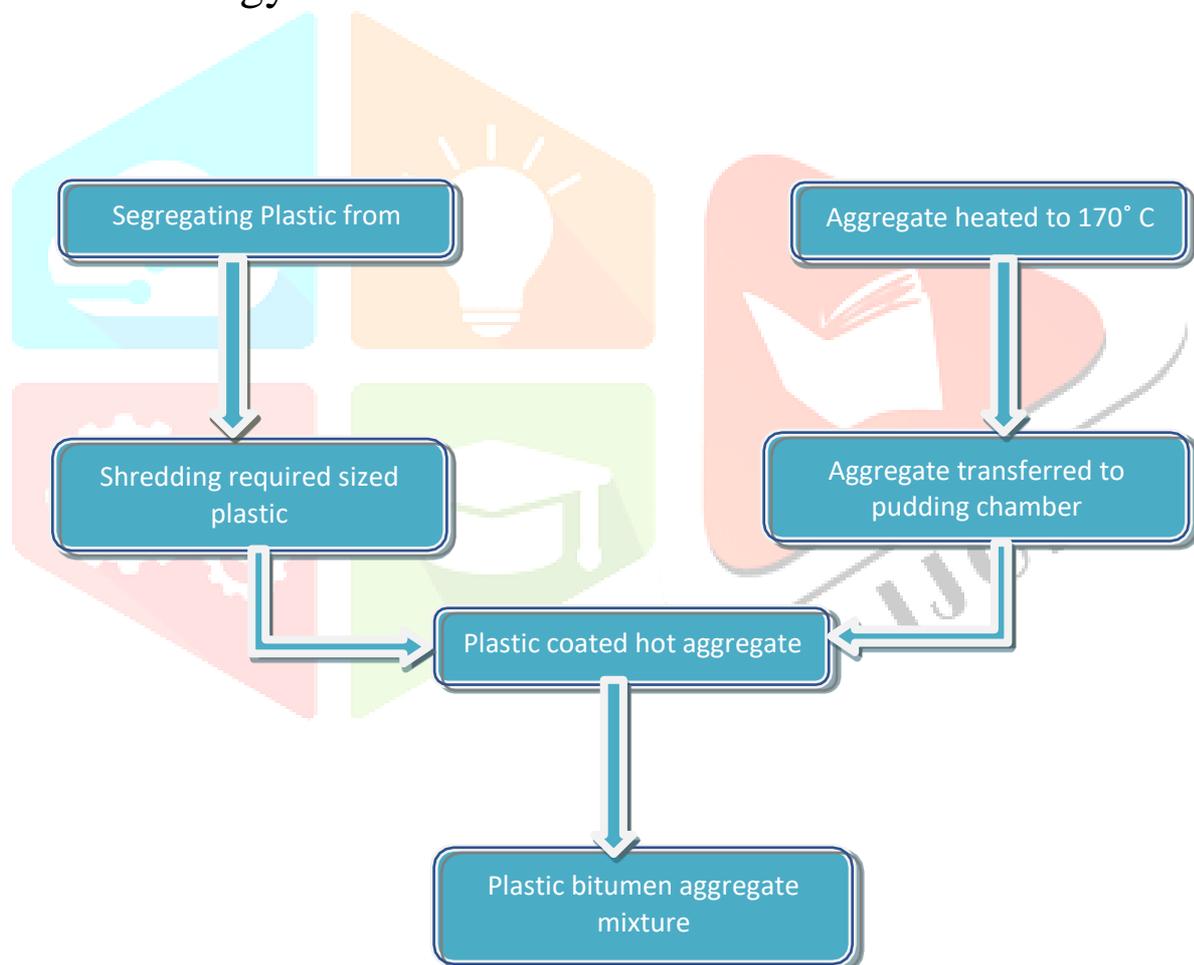
### 3. Objective:

- High Density polyethylene (HDPE) material use in flexible pavement for increase the Strength and better Performance of the road.
- Increasing various properties of road materials
- Reducing the plastic waste present in our environment and decrease environment pollution.
- To compare various properties of bituminous road and plastic bituminous road.

### 4. Scope:

- Making eco-friendly environment
- Increase road strength
- Maintenance cost is almost null
- Plastic waste from all the areas such as residential, commercial, industrial, institutional etc. is collected.

### 5. Methodology:



#### Construction Procedure of Plastic Roads

- Step-1:  
Plastics waste (bags, cups, bottles) made out of the PE, PP and HDPE cut into a size between 2.36 mm and 4.75 mm using shredding machine.
- Step-2:  
The aggregate mix is heated to 165°C and put in the mixing chamber. Quantity of plastic to be additional is about percentage of bitumen as per study.

- Step-3:  
Similarly, the bitumen is to be heated up to a maximum 160°C to have good binding and to prevent weak bonding.
- Step-4:  
At the mixing section, the shredded plastic waste is to be added. It gets coated uniformly over the aggregate within 30 to 60 seconds, providing oily look.
- Step-5:  
The plastic waste coated aggregate is mixed with hot bitumen and the resulted mixture is used for road construction. The roller used is 8 tons capacity.
- Step-6:  
The road laying temperature is between 110°C to 120°C. The roller used is 8 tons of capacity.

## 6. References

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