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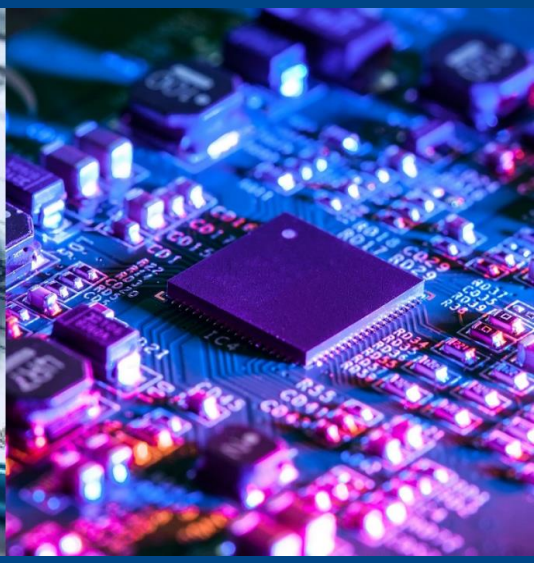

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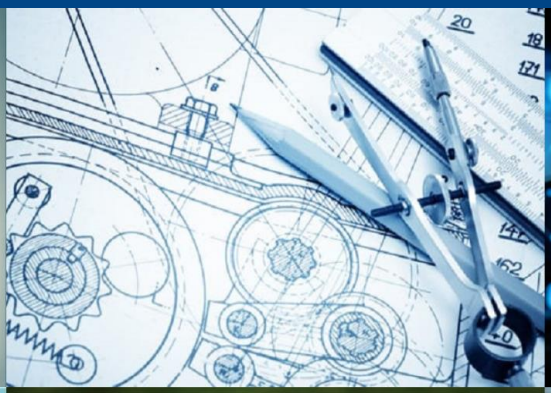

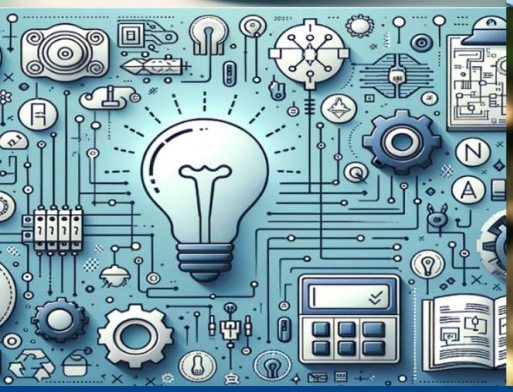

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Plastic Coated Aggregate and Bitumen Enhancement

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ABSTRACT: Plastic waste has become a major environmental concern due to its non-biodegradable nature and long degradation period. This study focuses on the utilization of waste plastic in road construction by coating aggregates with plastic and mixing them with bitumen. The objective is to improve the performance characteristics of bituminous roads while reducing environmental pollution. Experimental studies indicate that plastic-coated aggregates enhance strength, water resistance, and durability of pavements. Additionally, the use of waste plastic reduces bitumen consumption, making the process economical and eco-friendly. This research highlights the potential of plastic roads as a sustainable solution for modern infrastructure.

I. INTRODUCTION

Plastic is a polymer-based material that is durable and resistant to degradation, often taking up to 4500 years to decompose. With increasing population and consumption, plastic waste has become a major environmental issue.

Plastic waste, when used in road construction, forms a coating over aggregates and improves bonding with bitumen. This results in increased strength, water resistance, and durability of pavements. Plastic roads are cost-effective, reduce bitumen usage by around 10%, and help in managing waste effectively. Hence, the use of plastic in road construction is both economical and environmentally beneficial.

Figure 1: Polymethyl Methacrylate

II. LITERATURE REVIEW

Paper Title- Reuse of Waste Plastics Coated Aggregates-Bitumen Mix Composite For Road Application – Green Method.
Name of Author – S. Rajasekaran, Dr. R. Vasudevan
Publishing Year- (2013)
Journal - American Journal of Engineering Research (AJER)

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Plastic waste is a major environmental issue due to its non-biodegradable nature. The study shows that coating aggregates with waste plastic improves strength and durability of roads. It also helps in effective reuse of plastic waste and enhances load-bearing capacity of pavements.

Paper Title- A Study on using Plastic Coated Aggregate in Bituminous Mix for Flexible Pavement.
Name of Author – Abey Lulseged, K. Hemantharaja, C. V. S. R. Prasad
Publishing Year- (2016)
Journal - International Journal of Advance Research in Science and Engineering

This study focuses on developing economical and durable pavement materials. The use of plastic-coated aggregates reduces construction cost and improves flexibility and strength of roads, making it a suitable alternative to conventional materials.

Paper Title- Experimental Investigation of Plastic-Coated Aggregate.
Name of Author – Yogita Bhiva Alave, Sanika Shekhar Mahimkar, et.al.
Publishing Year-(2021)
Journal - International Journal of Engineering Research & Technology (IJERT)

The research highlights that plastic-coated aggregates increase strength and resistance of pavements. Using Marshall method, it was found that plastic improves durability and overall performance compared to normal bituminous roads.

Paper Title- Effects of plastic coating on the physical and mechanical properties of the artificial aggregate made by fly ash .
Name of Author – Wanli Ye, Shuai Li, Tairui Qiu, Xinyu Cong, Yiqiu Tan
Publishing Year-(2022)
Journal - Journal of Cleaner Production

This study shows that plastic coating enhances mechanical properties of aggregates. It improves strength and resistance, making aggregates more suitable for construction applications.

Paper Title- Evaluating the storage stability of SBR-modified asphalt binder containing polyphosphoric acid (PPA)
Name of Author - Yajin Han, Jiahao Tian, Jitong Ding, Liheng Shu, Fujian Ni
Publishing Year-(2022)
Journal- Journal of Civil & Environmental Engineering

The study explains that modifiers like PPA improve asphalt performance. It increases stability, durability, and resistance to deformation, making roads more reliable under heavy traffic.

No.	Paper Title	Author Name	Key Points	Remark
1	Reuse of Waste Plastics Coated Aggregates-Bitumen Mix Composite For Road Application – Green Method	S. Rajasekaran, R. Vasudevan,2013	Use of plastic-coated aggregates improves strength and durability; helps reuse plastic waste	Eco-friendly and improves load-bearing capacity
2	A Study on using Plastic Coated Aggregate in Bituminous Mix for Flexible Pavement	Abey Lulseged et al. 2016	Plastic-coated aggregates reduce cost and improve flexibility and performance	Economical and reduces maintenance cost
3	Experimental	Yogita Alave et al.	Marshall test shows improved strength,	Better performance than

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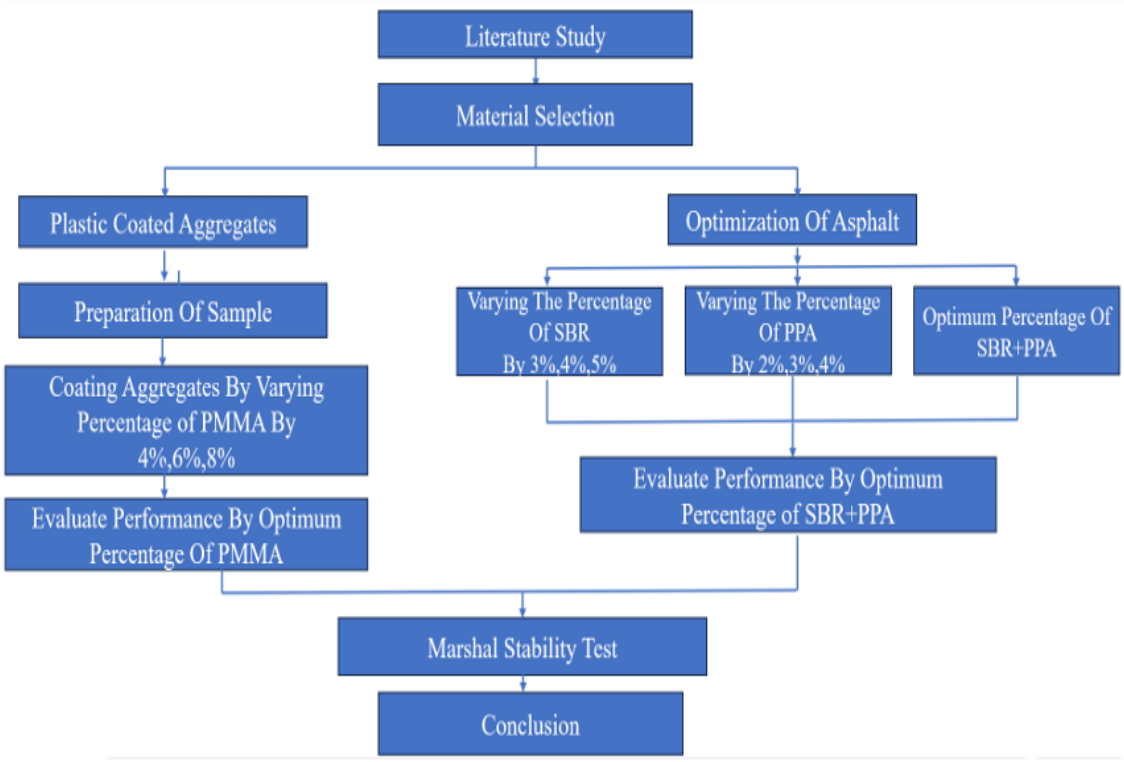
	Investigation of Plastic-Coated Aggregate	2021	durability, and water resistance	conventional roads
4	Effects of plastic coating on artificial aggregate made by fly ash	Wanli Ye et al. 2022	Plastic coating enhances mechanical properties and resistance	Increases lifespan of aggregates
5	Evaluating storage stability of SBR-modified asphalt with PPA	Yajin Han et al. 2022	Use of PPA improves stability, durability, and resistance to deformation	Suitable for heavy traffic conditions

The literature review shows that the use of plastic-coated aggregates significantly improves the strength, durability, and water resistance of bituminous roads. It also highlights that this method is cost-effective and provides an eco-friendly solution for managing plastic waste.

III. METHODOLOGY OF PROPOSED SURVEY



IV.CONCLUSION AND FUTURE WORK

The study concludes that the use of plastic-coated aggregates in bituminous roads significantly improves strength, durability, and resistance to water damage compared to conventional methods, while also providing an eco-friendly solution for managing plastic waste and reducing construction costs. In future, further research can be carried out on large-scale implementation, long-term performance under different traffic and climatic conditions, and optimization of plastic content along with advanced modifiers to enhance

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