

Comparison in Strength of Pervious Concrete Block by Using Natural aggregates and Plastic Coated aggregates

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Abstract - Industrial activities are associated with significant amounts of non-biodegradable solid waste, waste plastic being among the most prominent. This study involves increasing the efficiency of reusing waste plastic in the production of concrete. The plastic creates substantial garbage every day to which is much unhealthy. The shredded plastic waste was thoroughly mixed with heated aggregate forming a layer on the surface of the aggregates. 300gm of waste plastic was used to coat the aggregates by using 3% waste plastic to the weight of aggregates. All of the aggregates tests were done at the laboratory. The test conducted on plastic coated coarse aggregates and natural coarse aggregates are crushing test, Los Angeles abrasion value test, impact value test, water absorption test and specific gravity test. The test on plastic coated coarse aggregates proved that the properties of plastic coated coarse aggregates is good than the natural coarse aggregates. The compressive strength of the concrete cubes was tests at laboratory. 36 cubes were molded for compressive strength test. Curing ages of 7, 14, and 28 days for the concrete mixtures were applied in this work. The results proved that the compressive strength of Plastic coated coarse aggregates cubes is slightly less than the Natural coarse aggregates cubes.

Key Words: waste plastic, coat 3% plastic, natural aggregates, plastic coated aggregates, pervious concrete.

1. INTRODUCTION

Pervious concrete is a composite material consisting of coarse aggregate, Ordinary Portland cement and water. In this we replace the natural aggregate with plastic coated aggregate to know about the effective utilization of waste plastic in highway construction, wear and tear of aggregate, strength durability of modified aggregate and less water absorption.

The growth in various types of industries together with population growth has resulted has enormous increased in production of various types of waste material, world over, posing in difficult problems in developed as well as in developing countries. Today, every sector of economy starting from agriculture packaging, automobile, building construction, InfoTech has been virtually revolutionized by the application of plastic. The various waste material, plastic waste, tyre waste and municipal solid waste are of grade concern plastic waste consisting of mainly items such as carry bags, cups, thermocols and packaging films pose a measure problem for there disposal various organization

and researchers have made effort to find methods for effective utilization of some of this waste materials. The plastic waste could be use in road construction.

The pervious concrete is different from conventional concrete in that it contains no fines in the initial mixture, recognizing however, that fines are introduced during the compaction process. The aggregate usually consists of single size and is bonded together at its points of contact by a paste formed by cement and water. The result is concrete with a high percentage of interconnected voids that when functioning correctly permit the rapid percolation of water through the concrete. Unlike conventional concrete, which has a void ratio anywhere from 3-5%, pervious concrete can have voids ratio from 15-40% depending on its application. Pervious concrete characteristics differ from conventional concrete, pervious concrete has a lower compressive strength, higher permeability, and a lower unit weight, approximately 70% of conventional concrete.

2. LITERATURE REVIEW

The Use of plastic waste in concrete would open up a solution for the disposal issues regarding plastic wastes. Many research works have been done in the area of use of plastic waste in bituminous road construction

V.M. Malhotra (1976) discussed pervious concrete as it relates to applications and properties. He provided details on such properties as consistency, proportions of materials, unit weight, compatibility, and curing in an attempt to maximize permeability.

Raji (2007) investigated the "utilization of marginal materials as an ingredient in bituminous mixes". They concluded that plastic wastes can be used as additives on bituminous pavements. Hence in their study, the properties of bituminous mix when modified with shredded syringe plastic waste were investigated. The work was carried out by mixing shredded autoclaved plastic syringes with heated aggregates by dry process.

Dr. R. Vasudevan (2007) investigated that the coating of plastics reduces the porosity, absorption of moisture and improves soundness. The polymer coated aggregates bitumen mix forms better material for flexible pavement construction as the mix. Hence the use of waste plastics for flexible pavement is one of the best methods for easy disposal of waste plastics. Use of plastic bags in road help in many ways like easy disposal of waste, better road and prevention of pollution.

Dr. R. Vasudevan and S. Rajasekaran, (2007) stated that the polymer bitumen blend is a better binder compared to plain bitumen. Blend has increased Softening point and decreased Penetration value.

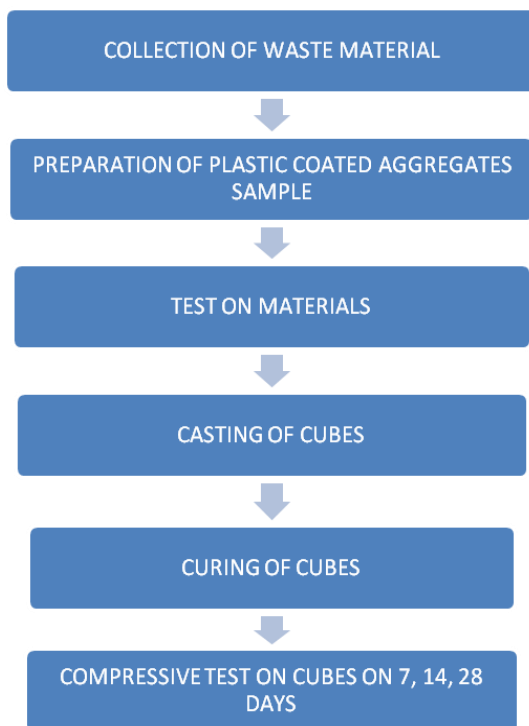
Pratiksha Singh Rajput, R. K. Yadav (2014)- IJRST Effect of Plastic Waste on Properties of Road aggregates - These plastic waste coated aggregates are tested for impact value, crushing value, specific gravity and water absorption. It has been found that there is significantly improvement in the properties of plastic coated aggregates.

Gawande (2012), Summarized an overview on waste plastic utilization in asphaltting of roads. They reviewed techniques to use plastic waste for construction purpose of roads and flexible pavements.

Dr. Bhageerathy (2014) investigated the use of biomedical plastic waste in bituminous road construction. They concluded that the Marshall stability value of plastic modified mix was found to be 51 percent more than that for the normal mix which indicates an increase in load carrying capacity.

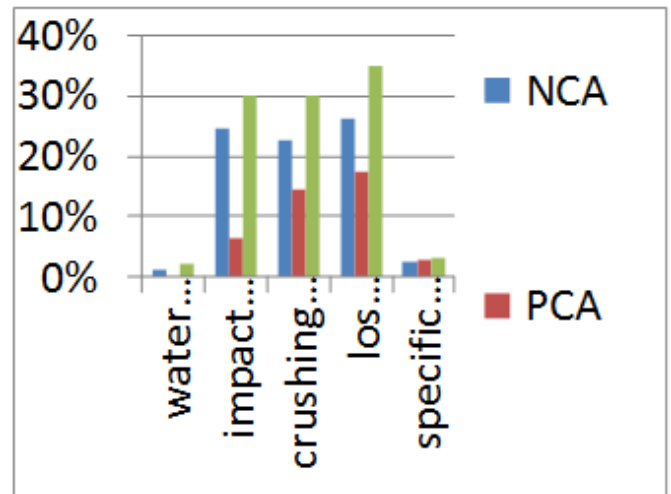
3. METHODOLOGY

The following methodology was adopted for this project of pervious concrete which is totally based on trial and error method



4. RESULTS

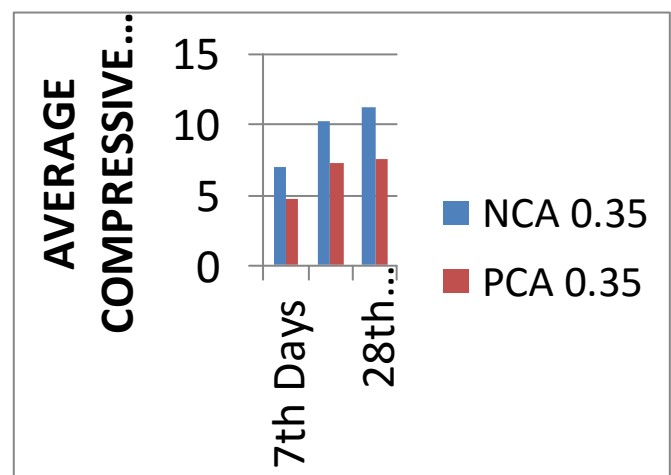
4.1 RESULTS OF TEST ON AGGREGATES

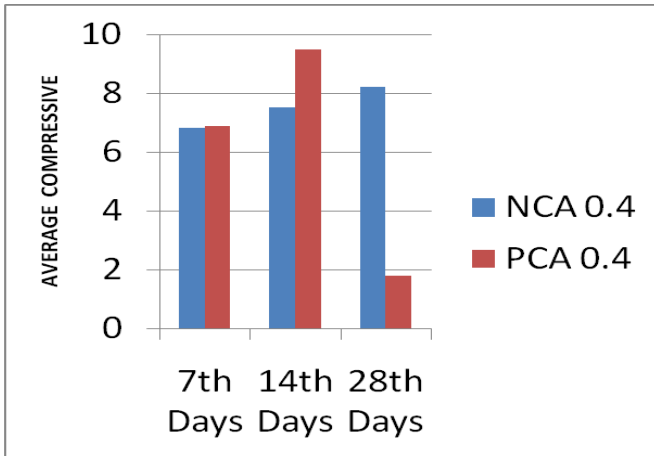


4.2 COMPRESSIVE STRENGTH RESULTS OF PERVIOUS CONCRETE SPECIMEN

SR. NO.	CUBES	W/C RATIO	C/A RATIO	AVERAGE COMPRESSIVE STRENGTH (N/mm ²)		
				7 DAYS	14 DAYS	28 DAYS
1	NCA	0.4	1:4.5	6.81	7.52	8.21
2		0.35		7.05	10.18	11.18
3	PCA	0.4	1:4.5	6.89	9.48	9.80
4		0.35		4.67	7.21	7.54

4.3 AVERAGE COMPRESSIVE STRENGTH GRAPH OF RESULTS





- American association of state highway and transportation officials (AASHTO), Standard specification for transportation materials and methods of sampling and testing.
- Dr. R. Vasudevan, Rajasekaran, study on the construction of flexible road using plastic coated aggregates.

BIOGRAPHIES



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5. CONCLUSION

- The compressive strength of PCA cubes is slightly less than the NCA cubes
- On the basis of the experimental results obtained, it is found that mixes prepare with plastic waste i.e. PCA has shown better properties compared to NCA pervious concrete.
- There is one major drawback of pervious concrete i.e. there is no IS code available for mix design
- The major drawback is while coating of aggregates we found that there is a little bit air pollution

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