

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

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Abstract- This paper presents comparison in strength of pervious concrete block by using Natural course aggregate (NCA) and plastic coated course aggregate (PCCA). 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. This work investigated prior studies on the compressive strength on pervious concrete as it relates to water cement ratio, aggregate size and compaction and compare those results with results obtained in laboratory experiments conducted on sample of pervious concrete block made of NCA and PCCA. 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. It has been found that there is significantly improvement in the properties of plastic coated aggregate and the compressive strength of PCA cubes is slightly less than the NCA cubes.

Index Terms- PCCA, NCA, Waste Plastic, Compressive Strength, pervious Concrete

1. INTRODUCTION

Pervious concrete is a composite material consisting of course aggregate, Cement and water. In this work Pervious concrete made by using NCA and PCCA. It 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 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, tire waste and municipal solid waste are of grade concern plastic waste consisting of mainly items such as carry bags, cups, thermo cols and packaging films pose a measure problem for there disposal various organization

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

- Pratiksha Singh Rajput, R. K. Yadav (2014) - IJIRST 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.
- V.M. Malhotra (1976) discussed about 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.
- 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.

- 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. 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.

1) Water absorption test
2) Impact value
3) Crushing value
4) Los Angeles test
5) Specific gravity test
6) Compressive strength

4. ANALYSIS AND RESULTS

Table 1. Properties of Aggregate

Test conducted	Plastic coated aggregates	Natural aggregates	IRC Specification
Specific gravity test	2.66	2.54	2.5-3.0
Crushing value	14.46%	22.6%	< 30
Los Angeles	17.56%	26.2%	< 35

test			
Water absorption test	0%	1%	< 2
Impact value	6.25%	24.6%	<30

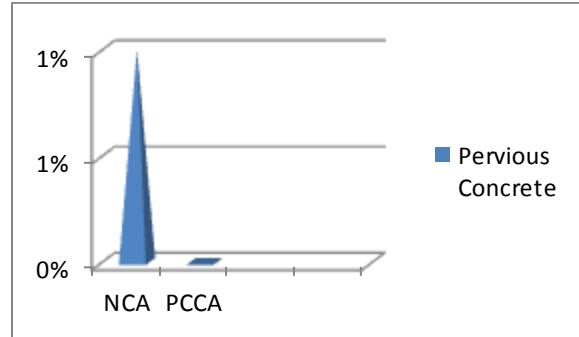


Chart 1: Water Absorption test

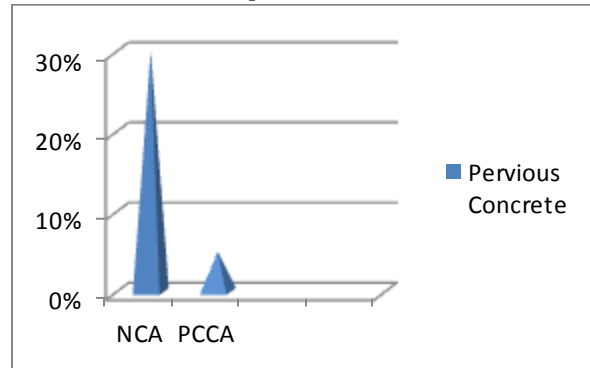


Chart 2: Aggregate impact value

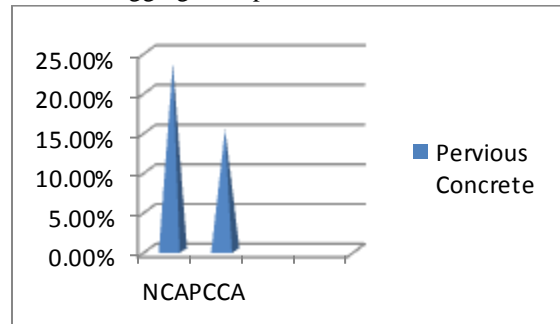


Chart 3: Aggregate Crushing Value

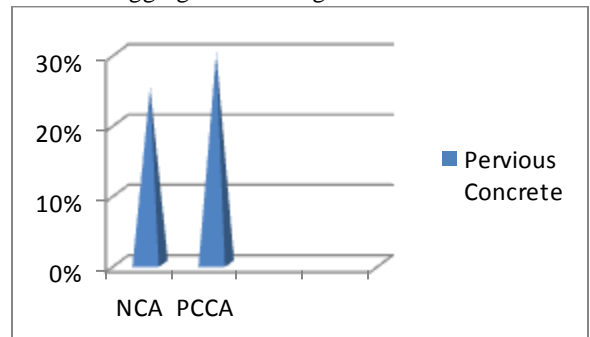


Chart 4: Aggregate Los-Angeles test

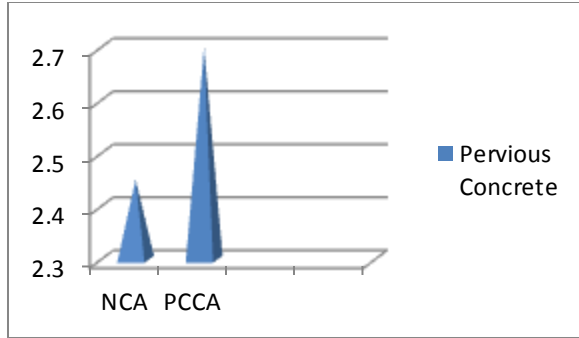


Chart 5: Specific Gravity

Table 2. Results of compressive test on NCA or PCCA pervious concrete

Sr no	Cubes	W/C ratio	C/A ratio	Average Compressive strength (N/mm ²)		
				7days	14days	28days
1	NCA	0.40	1:4.5	6.81	7.52	8.21
2		0.35		7.05	10.18	11.18
3	PCCA	0.40	1:4.5	6.89	9.48	9.80
4		0.35		4.67	7.21	7.54

5. CONCLUSION

The use of plastic waste in the construction of pervious concrete block is one of the best methods for the safe disposal and better performance of the pervious concrete if the plastic are used. The following conclusions are drawn from the study:

- The coating of aggregates with plastic reduces the absorption of moisture.
- Los angles abrasion value of PCCA was found to reduce as compared to NCA indicating that these aggregate have superior abrasion resistance compared to NCA.
- It was observed that for w/c 0.35, Compressive strength of NCA for 28 days is 11.18 N/mm² and PCCA for 7.54 N/mm² i.e. reduces in strength of PCCA pervious concrete as compared to NCA pervious concrete
- There is decrease in the PCCA impact value as compared to NCA without plastic. This means that the plastic coated aggregate have better impact resistance
- It was observed that PCCA crushing value was reduces as Compared to NCA. This implies that the crushed fraction will be lower when the PCCA are subjected to loads.
- There is small increase in specific gravity value of PCCA as compared to NCA.

- It was observed that for w/c 0.4, Compressive strength of NCA for 28 days is 8.21 N/mm² and PCCA for 9.80 N/mm² i.e. increase in strength of PCCA pervious concrete as compared to NCA pervious concrete

On the basis of the experiments result obtained, it is found that mixes prepared with plastic waste has shown better properties as compared natural course aggregate and The compressive strength of PCCA pervious concrete cubes for 0.40 W/c gives good strength as compared to NCA pervious concrete cubes. Hence it is one of the best method for disposal of plastic waste by using it in construction material.

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BIOGRAPHIES

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