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International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

STRENGTHENING OF PERVIOUS CONCRETE BY USING WASTE TIRES RUBBER

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Abstract

Examining "Experimental Studies on Pervious Concrete by Partial Replacement of Coarse Aggregates with Waste Rubber" is the goal of the current investigation. The main factors were taken into account while using pre-treated (sand coated) rubber shreds in place of coarse aggregates. For cement, rubber chips, fine and coarse aggregate, and both, physical characteristics tests were conducted. inclusion of rubber at a percentage of 3 percent, 6 percent, or 9 percent in the concrete. For controlled pervious concrete and different pervious concrete mix, slump tests and compaction factor tests have been undertaken. The control pervious rubberized concrete had compressive strengths of 2.5 percent, 5 percent, and 7.5 percent.

Keywords*: Waste tire rubber chips, Pervious concrete, Compressive strength and Spilt tensile strength.*

1. INTRODUCTION

Pervious concrete, often referred to as no fines, porous, gap-graded, and improve porosity concrete, has been discovered to be a viable storm water management method. Pervious concrete is by definition a combination of gravel or granite stone, cement, water, and little to no sand (fine aggregate). When pervious concrete is used for paving, the open cell structures allow storm water to pass through the pavement and into the underlying soils. In other words, pervious concrete aids in safeguarding the environment and pavement surface.The essential components of pervious concrete are the same as those of conventional concrete, which are interconnected voids that make up 15% to 30% of the volume and permit water to travel through the concrete. In order to increase the strength and workability of the concrete, high range water reducer and thickening agent are used. Although it has many uses, pervious concrete is primarily used in pavements, such as those found in parking lots, tennis courts, parking lots, alleys, driveways, low volume pavements, low water crossings, and sidewalks and pathways. It can also be used for slope stabilisation and as a sub-base for conventional concrete pavements.Pervious concrete has a recognised porosity that ranges from 15% to 30%. Despite the fact that pervious concrete is weaker and more porous than A unique variety of concrete classified as porous, no-fines, or permeable is known as pervious concrete

2. OBJECTIVES

The objectives of this study are as follows

a) To make the most use of pervious concrete.
b) To use scrap tyre rubber and coarse aggregate as efficiently as possible.
c) To assess the concrete's compressive and split tensile strength.

3. MATERIALS

The properties of cement are presented in Table 1.

Table 1 Physical properties of cement

S. No.	Property	Cement (53 grade)
1	Specific gravity	3.131
2	Fineness	9.72%

3.1WASTE TYRES RUBBER:

There is an increasing concern to the environment as scarp types are produced and gathered in enormous quantities. There is a lot of interest in recycling these non-hazardous solid wastes to reduce the negative impact of these depositions and for sustainable development. For more than 30 years, researchers have looked into the possibility of employing rubber from old tyres in a variety of civil engineering projects. Road building, geotechnical work, and the creation of cement mixtures are examples of applications where tyres can be used and where the addition of tyre rubber has shown to be effective in preserving the environment. Tyre recycling in the aforementioned uses is an appropriate method of disposal for both environmental and financial considerations.

3.2 PERVIOUS CONCRETE

Cement, coarse aggregate (size should be 9.5 mm to 12.5 mm), and water make up pervious concrete; little to no fine aggregates are used. The strength can be increased by adding a little bit of sand. The mixture contains a void content of 15 to 25 percent and a water to cement ratio of 0.28 to 0.40. It's crucial that the concrete has the right amount of water. The strength of concrete will rise with a low water to cement ratio, but too little water could lead to surface failure. The mixture appears wet-metallic when the water content is appropriate. The mixture needs to be field verified because this concrete is sensitive to water content. Using a Rapid Air method, where the concrete is painted black, entrained air may be measured.

4. EXPERIMENTAL INVESTIGATIONS

4.1 Compressive strength results

The compressive strength conducted in compression testing machine for the cast and cured specimens and the results are furnished in table 2.

Table2: Compressive strength of concrete replacement of coarse aggregate with waste tire rubber in pervious concrete

Sl.no	REPLACEMENT OF C.A WITH RUBBER TYRE IN PERVIOUS CONCRETE	7 days N/mm^2	28days N/mm^2
1	NPC	27.32	39.09
2	3%	29.53	42.93
3	6%	31.99	46.43
4	9%	36.27	51.86

Split Tensile strength results

At the age of 7 and 28days, the cylindrical specimens (150mm diameter x 300mm height) were tested for evaluating the split tensile strength.

Table5: Split Tensile strength of concrete replacement of coarse aggregate with waste tire rubber in pervious concrete

Sl.no	REPLACEMENT OF C.A WITH RUBBER TYRE IN PERVIOUS CONCRETE	7 days N/mm^2	28 days N/mm^2
1	NPC	2.73	3.86
2	3%	2.97	4.26
3	6%	3.12	4.53
4	9%	3.62	5.16

5. CONCLUSION

In this study, pervious concrete waste tire rubber as replacement of coarse aggregate. Rubber tires varied different percentages of NPC, 3%, 6%9%

1. The compressive strength of concrete for normal concrete for 7days and 28days is 27.32N/mm^2 and 39.09 N/mm^2.
2. The Split tensile strength of concrete for normal concrete for 7days and 28days is2.73 N/mm^2 and 3.86 N/mm^2.
3. The compressive strength of 9% replacement of coarse aggregate by waste tire rubbers for 7days and 28days is 36.27N/mm^2 and 51.86 N/mm^2.
4. The Split tensile strength of 9% replacement of coarse aggregate by waste tire rubbers for 7days and 28days is 3.62 N/mm^2 and 5.16 N/mm^2.

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