International Journal of Interdisciplinary Innovative Research &Development (IJIIRD)
ISSN: 2456-236X
Vol. **06** Special Issue **01** | **2021**

Use of Pervious Concrete Mixed With The Plastic Fibre

Prof. Pravin K. Patil[*1] Pratik A. Deshmukh*[2] Mohit P. Mapari*[3] Ms. Swati A. Kalaskar*[4]

1. *Assistant Professor, Department of Civil Engineering, Padm. Dr. V.B. Kolte College of Engineering, Malkapur India*
2. *Students, Department of Civil Engineering, Padm. Dr. V.B. Kolte College of Engineering, Malkapur India*

ABSTRACT

Pervious concrete is a special type of concrete which consist of course aggregate water. As there is no fine aggregate in the concrete mix the void content is more which allow the water flow through its body. So the pervious concrete is also called as permeable concrete and porous concrete. There is lot of research work is going in field of pervious concrete. The compressive strength of pervious concrete is less when compared to the conventional concrete as there are voids and less fine aggregate. Hence uses of pervious concrete are limited even though it has lot of advantages. The main aim of our paper is to improve the compressive strength and maintain permeability of pervious concrete. So we are adding waste (PET) bottles. Fibers which are cut into small thread of waste (PET) bottle and we have taken fibers of that small piece. Different proportion of plastic fibers is added in pervious concrete trial 1%, 2% and 3% after the mixing of plastic fiber. Compressive strength and permeability test perform on these blocks.

Keywords: ***Pervious concrete, Plastic Fibre, Compressive strength, waste (PET) bottle***

I. INTRODUCTION:

Pervious concrete is a special type of concrete with high porosity. It can use for concrete flatwork applications that allows water to precipitate, thereby reducing the runoff from a site and allowing ground water recharge. The concrete paste then coats the aggregates and allows water to pass through the concrete slab. Pervious concrete is traditionally used in parking areas, areas with light traffic, residential streets, pedestrian walkways, and greenhouses. It is an important application for sustainable construction and is one of many low impact development techniques used by builders to protect water quality. The pervious concrete strength characteristic is as important as its permeability characteristics. The strength of the system not only relies on the compressive strength of the pervious concrete but also on the strength of the soil beneath it for support. Pervious concrete consists of cement, coarse aggregate and water with little to no fine aggregates. Water to cement ratio of 0.28 to 0.40 with a void content of 15 to 30%. The correct quantity of water in the concrete is critical. A low water to cement ratio will increase the strength of the concrete, but too little water may cause surface failure. As this concrete is sensitive to water content, the mixture should be field checked. A pervious concrete mixture contains little or no sand (fines), creating a substantial void content. Using sufficient paste to coat and bind the aggregate particles together creates a system of highly permeable, interconnected voids that drains quickly. Typically, flow rates for water through pervious concrete are typically around 480 in./hr (0.34 cm/s, which is 5 gal/ft²/ min or 200 L/m²/min), although they can be much higher.

II. OBJECTIVE

- To use waste plastic bottles in a more suitable way.
- To check compressive strength of pervious concrete mixer with plastic fibres.
- To check permeability of pervious concrete mix with plastic fibre.
- To compare compressive strength of pervious concrete mixed with plastic fibres with regular concrete.
- To compare permeability of normal pervious concrete with pervious concrete mixed with plastic fiber.

III.METHODOLOGY

1. To collect the waste plastic like plastic cups, bottles etc. and they are cleaned.
2. Plastic waste (cups, bottles) are cut into fibres of size of 40 mm length and breadth is 1mm.
   Samples are made of -
   a) 1.0% plastic fibre

b) 1.5% plastic fibre
c) 2.0% plastic fibre

3. Mix design is done and conventional concrete block is tested and pervious sample of different proportion are also tested for strength and permeability.
4. Comparison between the different samples.

Pervious Concrete Mix Design According To Aci 522r-06

Pervious concrete of strength 25Mpa
Design average cube strength at 28 days
25/0.75 = 33.33 N/mm2
A/C = 3
Optimum W/C ratio = 0.31
Density of Concrete = 2500 Kg/m3
Density of Cement = 1700 Kg/m3
Density of coarse aggregate: 12.5 mm = 1650 Kg/m3
A/C ratio by weight = 3x 1650/ 1700 = 2.91
Cement: Aggregate: Water
1: 2.91: 0.31
Quantities of Materials Per Concrete Block:
Cement: 0.669kg
Coarse aggregate: 1.948kg
Water: 0.207litre

IV. RESULTS AND DISCUSSION

Compressive strength of pervious concrete after Adding Plastic fibre and curing After 28 Days

Sr.No	Percentage plastic	No of block	Load (KN)	Area (MM^2)	Compressive strength N/MM^2
1	0%	BLOCK NO:1	325000	150*150	14.44
		BLOCK NO:2	327000	150*150	14.53
2	1%	BLOCK NO:1	512000	150*150	22.75
		BLOCK NO:2	520000	150*150	23.11
3	1.5%	BLOCK NO:1	392000	150*150	17.42
		BLOCK NO:2	386000	150*150	17.15
4	2%	BLOCK NO:1	196000	150*150	8.71
		BLOCK NO:2	212000	150*150	9.42

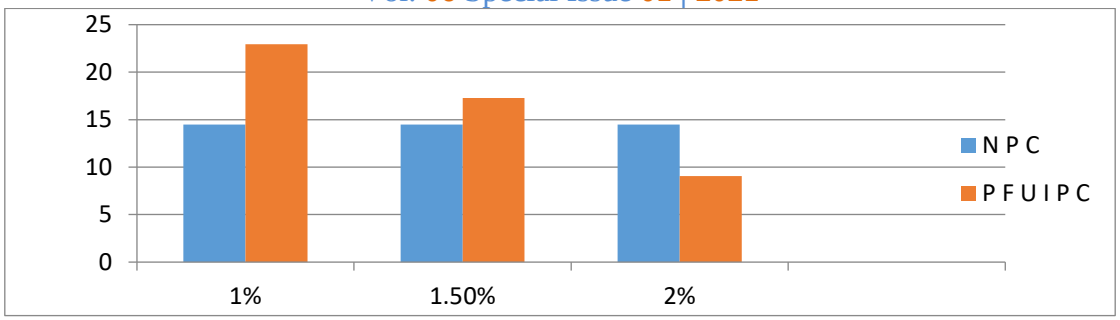
5.1 Observation table

Permeability:

Sr. No.	Percentage plastic	No. Of Block	Quantity of water Millimeter (cm)	Thickness Of Specimen (cm)	Pressure Head (cm)	Time (Min)	Permeability $K= \frac{Q}{T\frac{H}{L}}$
1	0.0 %	1	950	10.5	50	9.66	34.4 %
2	1.0%	1	950	10.5	50	10.38	32.02 %
3	1.5%	1	950	10.5	50	11.5	28.9%
4	2.0 %	1	950	10.5	50	14.25	23.8%

5.2 Observation table

Comparison of Compressive Strength Between Different percentage of plastic Fibre Used In Pervious Concrete With Normal Pervious Concrete:



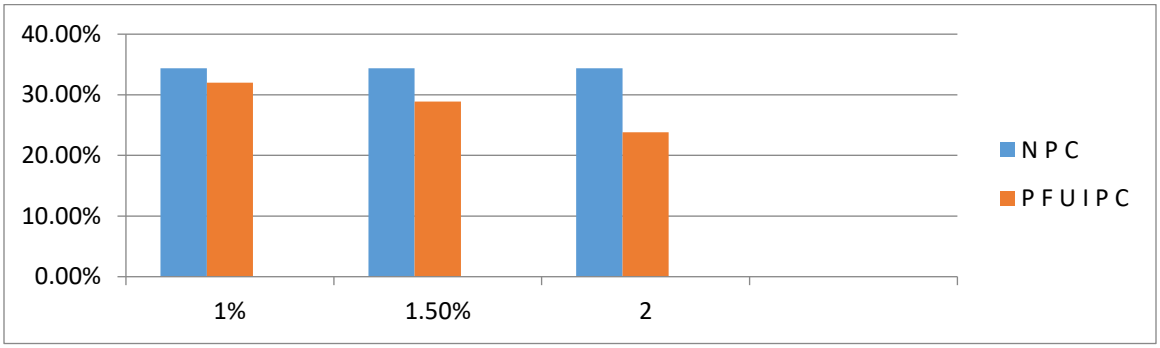
Graph : 01

Where,

N P C = Normal Pervious Concrete

P F U I P C = Plastic Fibre Used In Pervious Concrete

Comparison of Permeability between Different Percentages of Plastic Fibre Used In Pervious Concrete With Normal Pervious Concrete:



Graph: 02

Where,

N P C = Normal Pervious Concrete
P F U I P C = Plastic Fibre Used In Pervious Concrete
From the analysis of result we found that 1% of plastic mix gave the best result with the increase compressive strength and comparatively less reduction of permeability. But addition of fibers reduces permeability with less increase in compressive strength. Compared to plastic fibre mix.

V. CONCLUSIONS

Practically the compressive strength of pervious concrete less as compared to conventional concrete. The 1% of plastic fibre of pervious concrete compressive strength increases 57.81% as comparatively normal pervious concrete. As well as permeability reduced 2.38%.The 1.5% of plastic fibre of pervious concrete compressive strength increase 20.16% as comparatively normal previous concrete. As well as permeability reduced 5.5%.The 2% of plastic fibre of pervious concrete compressive strength Reduce 37.61% as comparatively normal pervious concrete. As well as permeability reduced 10.6%.If percentage of plastic fibre will increase then the compressive strength of pervious concrete will decrease. If percentage of plastic will increase then then permeability will also decrease. The best proportion of plastic fibre is 1% for compressive strength as well as permeability. Therefore we can use 1% of plastic fibre in pervious concrete for the purpose of parking lots, roadway, and playground etc.

REFERENCES:

1) *Debu*Mukarjee, Aritra Mandal, (6 June 2016)", Study on mechanical properties of plastic fiber reinforced concrete"(IJSR).
2) Salahaldinal sadey (27 June 2016), "Utilization of plastic bottle in concrete"(ICJ)
3) Batle Sanjay kumar, prof. S. N. Daule, (11 November 2017) "Use of plastic fiber in concrete"(IJSR)
4) Dr.Prahallada, Prakash K.B (22 November 2017), "Strength and workability characteristic of wastage plastic fiber reinforced concrete produce from recycle aggregate."(IJSR)
5) R. Kandasamy, R. murgesan, (3 march 2011), " Fiber reinforcement concrete using domestic waste plastic as a fiber. (ICJ)
6) Ravikumar G and prof. Manjunath M, (4 July 2015), "investigation of waste plastic fiber reinforced concrete using manufactured sand as fine aggregate."(ICJ)
7) Asha S. Resmi P. R, (3 September 2015), "Experimentally research on concrete with straight and creped waste plastic fibers "
8) Dr. R.R. Singh and Err. A.S. Sidhu, (December 2015), "Strengthening of Pervious Concrete for High Load Road Application."