

Experimental Study on Pervious Concrete

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Abstract - The project initiates with the detailed study of characteristics of pervious concrete that can be adopted as pavement. Pervious concrete pavement is sustainable type of concrete pavement that can protect and restore natural ecosystem. It is one of the most effective pavement material to address a no. of important environmental issue, such as recharging groundwater and reducing storm water runoff. The amount of general Portland cement has been reduced by introducing fly ash as cementations agent in pervious concrete sample. The properties of pervious concrete samples including density, porosity, compressive strength, etc. According to the result, high porosity samples indicated higher permeability, whereas compressive strength was reduced. There was no significant difference between properties of pervious concrete samples containing fly ash and those samples only comprises only cement as cementations agents. In this project M30 Grade of concrete is adopted and cubes of size 150mm×150mm×150mm were casted for different sizes of coarse aggregates without fine aggregate. The results of 7 days, 14 days, 28 days were analyzed and compared accordingly.

Key Words: Compressive Strength, Pervious Concrete, Porosity etc.

1. INTRODUCTION

Now a day’s concrete pavement are widely used to enhance comfort for all citizens. But at the same we want to study about environment, because lack of water absorption and air permeability of common concrete pavement rain water is not entered in to ground directly. It will reduce ground water table, plants are difficult to grow normally, difficult to maintain temperature and humidity of earth. Many advantages of pervious concrete are as follows –

1. The Rain water quickly filtered in to the ground, so ground water table can increase.
2. As the pavement is air permeable and water permeable, the soil underneath can be kept wet. It improves the environment of road surface

1.1 APPLICATION OF PERVIOUS CONCRETE

- I. Parking lot Pavement
- II. Sub base for conventional concrete pavement
- III. Light traffic street
- IV. Road shoulder

- V. Edge drains
- VI. Slope stabilization

1.2 HISTORY OF PERVIOUS CONCRETE

Pervious concrete was first used in the 1880s in Europe as pavement surfacing and load bearing walls. Cost efficiency was the main motive due to a decreased amount of cement. It again became popular in 1920s for two storey homes in Scotland and England. It became increasingly viable in Europe after WWII due to the scarcity of cement. It did not become as popular in the US until the 1970s. In India it became popular in 2000.

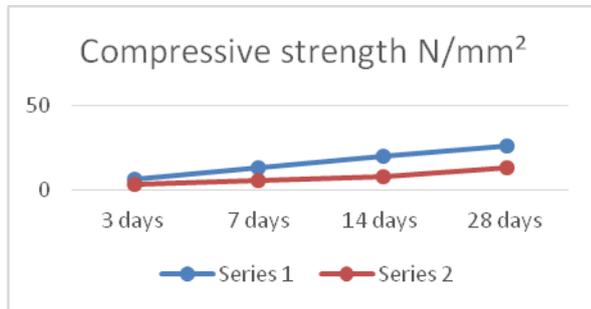
2. Compressive Strength Of Conventional & Pervious Concrete

Sr. No.	Types of concrete	Results (Compressive strength in N/mm ²)		
		7 days	14 days	28 days
1.	Conventional Concrete	12.6 N/mm ²	19.9 N/mm ²	26 N/mm ²
2.	Pervious concrete	5.06 N/mm ²	7.3 N/mm ²	13.2 N/mm ²
	• Coarse pervious concrete			
	• Medium pervious concrete	6.17 N/mm ²	-	-
	• Fine pervious concrete	8.67 N/mm ²	-	-



Fig. 1: Cube for Testing

3. Results



Series 1= Convention concrete cube

Series 2= Pervious concrete cube of 20 mm

Graph: Sample Compressive Strength at 3 to 28 days

This chapter shows detailed results and comparison between pervious concrete and conventional concrete with respect to its porosity and compressive strength of different proportions. Various tables, charts and graphs are shown to discuss the result and feasibility. Also duration of the present research was calculated so as to relate such type of future work to be done.

4. LITRATURE SUMMARY

In this chapter literature of various research paper of different authors are cited and their summary is presented. However, it was observed that most of the research paper has discussed the properties of pervious concrete are from foreign countries. There are very less no. of research paper from India which have discussed about the pervious concrete. It is also observed that pervious concrete has a great potential to reduce roadway noise, improve splash and spray, and improve friction as a surface wearing course. A pervious concrete mix design for a surface wearing course must meet the criteria of adequate strength and durability under the site-specific loading and environmental conditions. To date, two key issues that have impeded the use of pervious concrete are strengths of pervious concrete have been lower than necessary for required applications.

5. CONCLUSIONS

- Pervious concrete helps the water infiltrate into ground water discharge and maintaining stability of ground water level.
- Pervious concrete advantages are major over its disadvantages. Thus it can be used in areas as mentioned earlier which would be more beneficial.
- From research it will be concluded that the pervious concrete containing finer coarse aggregate gives more strength i.e. 12.8 N/mm² for 3 days

- The W/C and aggregate size had an effect on porosity and strength.
- If the W/C of pervious concrete increases, the porosity decreases.
- Pervious concrete needs proper mix design.
- The replacement of the cement in the concrete by the fly ash up to a few percentage.
- Physical properties of environmentally friendly pervious concrete should be in the acceptable range for limited use.

FUTURE SCOPE

We can utilize 25mm total size for the future examination or investigation. Pervious cement is an uncommon sort of cement with a high porosity utilized for solid asphalt application that permits water from precipitation and different sources to go specifically through it, in this way decreasing the overflow from a site and permitting groundwater revive.

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