

EXPERIMENTAL STUDY ON PERVIOUS (NO-FINE) CONCRETE SLAB

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Abstract - Pervious concrete consists of uniform graded material consisting of Cement, Aggregate, Admixture and Water. The mix design is done considering only cement and coarse aggregate, since the concrete is the "No-fine Concrete" The mix ratio is considered as 1:3.58 and water cement ratio is taken as 0.25. The Properties of Pervious concrete is enhanced by the addition of Fly ash, Silica fume as Partial replacement of cement. Latex and polypropylene are also used to increase the strength of pervious concrete by improving their characteristics. The addition of Fly ash and silica fume was assigned as 20 % and 5% by volume of cement. 7% of latex by water, 0.2% of polypropylene. The Load deflection behavior of pervious concrete slab was predicted using Finite Element Analysis (ANSYS –Workbench). For slab, Numerical Analysis in Ansys compared with manual calculation and found to have a good correlation. A laboratory experiment is conducted, to verify the numerical analysis results through Experimental Investigation of Compressive strength of Cube, Split Tensile strength of Cylinder and Load deflection behavior of slab.

Key Words: Cement; Flyash; Polypropylene fiber; Compressive strength; Load deflection behavior

1. INTRODUCTION

Pervious concrete is a special type of concrete with a high porosity used for concrete Flatwork applications that allows water from precipitation and other sources to pass through it, thereby reducing the runoff from a site and recharging ground water levels. The void content can range from 18 to 35% with compressive strengths of 400 to 4000psi. The infiltration rate of pervious concrete with fall into the range of 2 to 18 gallons per minute per square foot (80 to 720 litres per minute per square meter). Typically pervious concrete has little to no fine aggregate interconnectivity of the voids. Pervious concrete is traditionally used in parking areas, areas with light traffic, pedestrian walkways, and greenhouses. Pervious concrete is an important application for sustainable construction

1.1 LITERATURE REVIEW

1. Alena Sicakova and Marek Kovac used single size coarse aggregate, 7% of sand, cement and plasticizer in the pervious concrete is enhanced the strength The Compressive strength reached 17.5 Mpa.

2. C.H.HariSaiPriyanka – Cement, Coarse aggregate, water reducer, admixture Conplast P211 on Pervious concrete Laboratory Test such as Compressive strength and Split-Tensile strength were conducted.

3. Arun.H, Flanglin jose.L- Cement, Coarse aggregate, Nano silica admixture on Pervious concrete, Laboratory test such as Compressive strength, Split- Tensile strength, Permeability, Flexural Strength.

2. MATERIALS

Cement, Flyash, Silicafume, Latex, Polypropylene fiber

Table -1: Range of materials used in pervious concrete

MATERIALS PROPORTIONS(Kg/m ³)
Cementitious material 384
Coarse aggregate 1375
W/C ratio 0.25
The mix design ratio is 1:3.58

2.1 ANALYTICAL MODEL USING FEM METHOD

From the above values, the Optimized value for slab dimension & deflections are discussed below,

Length: 700mm, Breadth: 700mm, Depth : 100mm

Support: Simply support, Deflection: 0.286mm (ANSYS), 0.28 (MANUAL) - Pervious

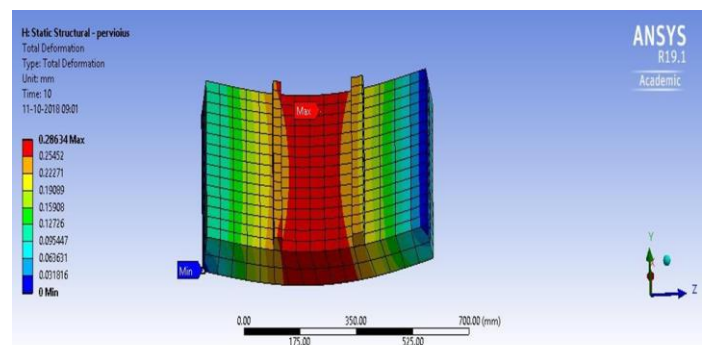


Fig -1: Deflection for pervious concrete

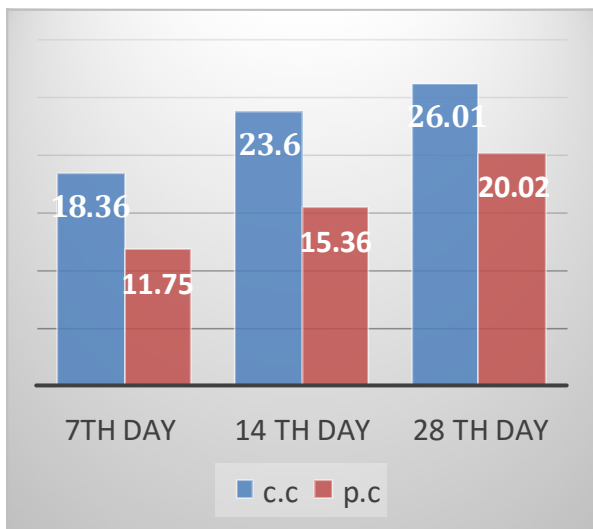


Chart -1: conventional concrete VS Pervious concrete cube

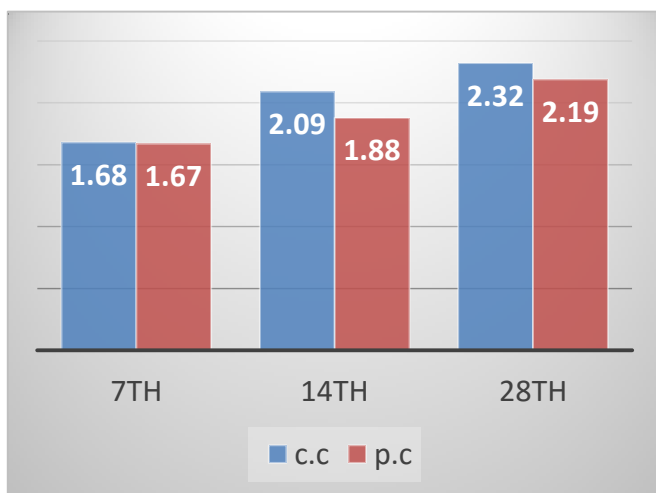


Chart -2: conventional concrete VS Pervious concrete cylinder

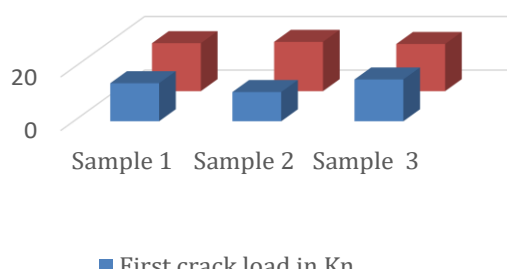


Chart -3: Comparison of load carrying capacity of the slabs with fiber

MODEL	ULTIMATE LOAD (kN)		LOAD CARRYING CAPACITY (kN)	
	SLAB	Numerical	15	Numerical
	Analytical	15	Analytical	0.286
	Experimental	17.97	Experimental	0.278

3. CONCLUSIONS

1. From the previous work done in pervious concrete and advantages integrated concludes that Addition of latex helps filling of porous in pervious concrete, also increases the strength simultaneously found that pervious concrete with latex can be used in structural applications.
2. The pervious concrete slab without fiber shows 10.32 % greater deflection when compared with pervious concrete slab with fiber.
3. The Numerical deflection obtained for pervious concrete slab is 2.14 % and 0.71% lesser than the deflection in Analytical and Experimental investigation respectively.
4. The deformation due to load on Pervious concrete slab is in the range of permissible limits.
5. Finally, further study should be conducted on the pervious concrete pavement produced with these material proportions to meet the condition of increased abrasion and compressive stresses due to high vehicular loading and traffic volumes.

APPLICATIONS OF PERVIOUS CONCRETE

1. Parking lots
2. Tree gates in sidewalk.
3. Tennis court
4. Residential roads
5. Alleys and driveways
6. Animal stalls

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BIOGRAPHIES



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