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[ijirset@gmail.com](mailto:ijirset@gmail.com)

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# Study of Pervious Concrete Pavement for the Sustainable Drainage System

Prof. Santosh Mahadev Kinayekar<sup>1</sup>, Prof. Prathamesh Vilas Patil<sup>2</sup>, Swapnil Subhash Shelar<sup>3</sup>,  
Harsh Pradip Bhanushali<sup>4</sup>, Mansi Vaibhav Manje<sup>5</sup>, Bhushan Prakash Patil<sup>6</sup>

Assistant Professor, Department of Civil Engineering, Alamuri Ratnamala Institute of Engineering and Technology,  
Shahapur, Thane, Maharashtra, India<sup>1,2</sup>

U.G. Student, Department of Civil Engineering, Alamuri Ratnamala Institute of Engineering and Technology,  
Shahapur, Thane, Maharashtra, India<sup>3,4,5,6</sup>

**ABSTRACT:** Pervious Porous Concrete is a no fines concrete; water is a noteworthy constituent. Penetrable concrete is an uncommon kind of strong, which includes coarse aggregates, water, admixtures and distinctive cementations materials. As there are no fine aggregates used in the strong cross section, the void substance is more which allows the water to travel through its body. Permeable concrete fuses solid, water and if vital, coarse masses, admixtures and unmistakable cementations constituents. There is bundle of exploration work is going in the field of porous concrete. The quality traits and structure of porous concrete is less when appeared differently in relation to the standard concrete on account of its porosity and voids. Thus, the utilization of porous concrete is compelled in spite of the way that it has some portion of good conditions. However, it will in general be seen that with increase in quality, the permeability of penetrable strong will be diminished.

**KEYWORDS:** Previous Pavement, Footpath, Parking Areas with Light Traffic, Storm Water and Drought etc.

## I. INTRODUCTION

Production of Permeable concrete is based on the percentage of voids present in the concrete. So moreover important given to maintain the high voids contain with loss of considerable strength. The main constituents are the Cement, Flyash, Coarse Aggregate, water and admixtures. Motivation behind this work is to produce permeable concrete by using conventional concrete material. Pervious concrete is also a unique and effective means to address important environmental issue and sustainable growth. In winter season pervious concrete automatically act as a drainage system and results in a very high permeable concrete that drains quickly. Pervious concrete can be used in a wide range of application although these are it's a primary usage which are in the residential road, crossing side walls, footpath, parking areas, low volume traffic etc.

## II. RELATED WORK

Permeable Concrete is blended with Cement, Flyash, Coarse Aggregate, water and admixtures. Ratio against the mixing of concrete is decided based on the number experiment done in laboratory. Especially the laboratory test such as slump cone test, compressive strength test, percentage of voids present in the prepared specimen and percentage of permeability of specimen.

### Cement (Grade 53):

Cement is a principal constitutes of concrete and plays very much important role in concrete. For the present study a OPC 53 Grade cement is used as per standards of manufacturing industry with specific gravity of 3.15 and fineness of 292 m<sup>2</sup>/kg confirming to IS 8112:1989 is being used.

### Coarse aggregate:

Locally available crushed angular coarse aggregate having maximum size of 12.5 mm to 16mm were used in the present work. The specific gravity of coarse aggregate was 2.90 and bulk density 1553kg/m<sup>3</sup>.

**Fly ash (FA):**

Fly ash used as cement replacement material with a specific gravity of 2.2 and blains fineness of 229 m<sup>2</sup>/kg.

**Water:**

Potable tap water was used for the preparation of specimens and curing of specimens with approximate Ph value 7.

**Superplasticizer:**

The super plasticizer used as Conplast SP430.

Fig. 1 Cement



Fig. 2 Coarse aggregate



Fig. 3 Fly ash



### III. METHODOLOGY

#### Mixture Proportions:

In the present investigation 10% cement is replaced by fly ash, this is optimised by trial workability test which is kept constant. The ratios are selected based on laboratory test. Permeable Concrete is blended with Cement, Flyash, Coarse Aggregate, water and admixtures. Ratio against the mixing of concrete is decided based on the number experiment done in laboratory.

Table1. Mix Proportion

Cement	Coarse Aggregate	Fly ash	Water Content	Super Plasticizer
492 kg/m <sup>3</sup>	1476kg/m <sup>3</sup>	54kg/m <sup>3</sup>	169 litres	8.19 litres
1.00	3.00	0.10	0.31 (w/c ratio)	1.50 %

#### Preparation of cube specimens:

Materials are collected from the source and properly mixed as per standards in the laboratory either by hand or in a laboratory batch mixer. Clean the moulds and apply grease or oil and fill the mixed concrete in the moulds in 3 equal layers. Compact each layer with not less than 25 strokes per layer using a tamping rod 16mm diameter and 60 cm long. Level the top surface and smoothen it with a trowel. The test specimens are stored in moist air for 24 hours and after this period the specimens are marked and removed from the moulds and kept submerge in clear fresh water until taken out prior to test. Remove the specimen from water after specific curing time and wipe out excess water from the surface. Place the specimen in the machine in such a manner that the load shall be applied to the opposite side of the cube casted. Apply the load gradually till the specimen breakdown and Record the maximum load.

#### Photo Gallery for the on field practical work:



**IV. EXPERIMENTAL RESULTS**

**Mixture Proportions:**

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**Compressive Strength Test on Pervious Concrete:**

Fig. 4 Cube Tested for Compressive Strength



**Compressive Strength Test Result**

Table 2. Compressive Strength of Concrete at 28 days of Curing

Grade of Concrete	Specimen	Compressive Strength (N/ mm <sup>2</sup> ) At 28 Days	Average Compressive Strength (N/ mm <sup>2</sup> ) At 28 Days
M60 (Conventional Concrete Specimen)	A1	56	55.16
	A2	54	
	A3	55.5	
M60 (Pervious Concrete)	B1	24	26.3

Specimen)	B2	26	
	B3	29	

## V. CONCLUSION

As the strength of pervious concrete is less when compared to conventional concrete its application is limited to great extent. The main aim of this work is to obtain a pervious concrete, so that it can be used for large number of applications. The compressive strength of pervious concrete inversely proportional to permeability and percentage of voids present in the concrete. as the compressive strength increase the permeability will be decrease and vice versa.

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