

IMPROVEMENT OF COMPRESSIVE STRENGTH OF PERVIOUS CONCRETE BY USING FLY ASH

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ABSTRACT:

Pervious concrete is a special type of concrete, which consists of cement, coarse aggregates, water and if required, admixtures and other cementitious materials. As there are no fine aggregates used in the concrete matrix, the void content is more which allows the water to flow through its body. So the pervious concrete is also called as Permeable concrete and Porous concrete. The compressive strength of pervious concrete is less when compared to the conventional concrete due to its porosity and voids. If the compressive strength and flexural strength of pervious concrete is increased, then it can be used for more number of applications. If the properties are improved, then it can also be used for medium and heavy traffic rigid pavements also. The pervious concrete eliminates surface runoff of storm water, facilitates the ground water recharge and makes the effective usage of available land. The main aim of our project is to improve the strength characteristics of pervious concrete. But it can be noted that increase in strength, the permeability of pervious concrete will be reduced.

INTRODUCTION:

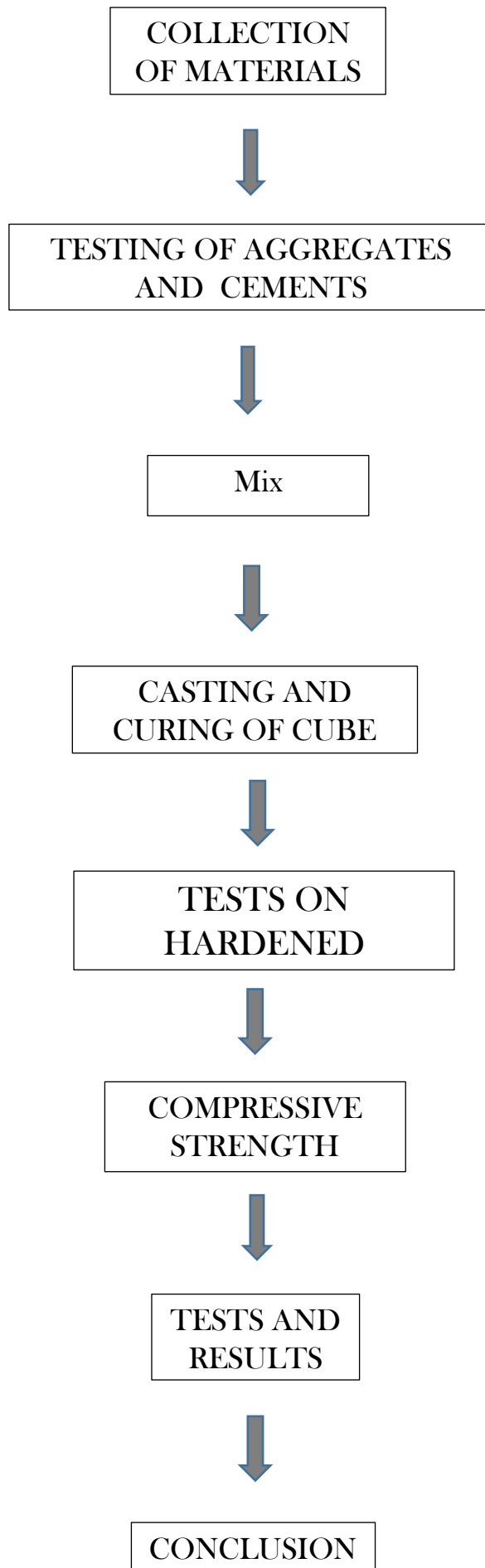
Permeable pavement is a technique which allows storm water to enter through it.

In addition to reducing run off, this techniques efficiently traps suspended solids, filters and pollutants from water.

Examples for this types of systems includes roads, paths, lawns and lots that are subjected to light traffic.



METHODOLOGY:



TESTS ON CEMENT:

OPTIMISED MIX DESIGN OF PERVIOUS CONCRETE (WITH 20MM-10MM SIZED AGGREGATES, 53 GRADE CEMENT), TESTED AT NEC NELLORE CONCRETE TECHNOLOGY LABORATORY:

Properties of materials tested in the laboratory:

TESTS ON CEMENT:

OPC-53 grade cement:

S.NO	PROPERTY	VALUE
1	Specific gravity	2.79
2	Fineness	10%
3	Initial setting time	31 min
4	Final setting time	10HRS
5	Sound ness	1 mm
6	Consistency	32%

TESTS ON COARSE AGGREGATES:

Coarse aggregates (locally available 20mm size aggregates):

PROPERTIES OF COARSE AGGREGATES
TESTED AT TRANSPORTATION
ENGINEERING LABORATORY

S.NO	PROPERTY	VALUE
1	Flackiness and elongation	26%
2	Impact strength	22.98%
3	Crushing strength	26.45%
4	Specific gravity	2.7

MIXED DESIGN ;

The pervious concrete was designed mainly using coarse aggregates along with the cement paste used. The selection of water-cement (w/c) ratio and the dosage of admixture also got the significant role in developing the necessary workability and the strength characteristics of PC. The voids were developed in the PC by the narrow gradation of coarse aggregate particles

CASTING OF SPECIMENS ;

The cube moulds are made from iron of dimensions 150mm (inside). The moulds are lubricated properly and made leak-proof, before pouring concrete into the mould. The homogeneity of concrete has been ensured after pouring into the desired mould as shown in Figure



CURING OF SPECIMENS ;

The specimens were removed from the mould after 24 hours of casting and subjected to the hydration period of 7,14 and 28 days. Before testing, the cubes were placed at the atmospheric temperature for the duration of three hours for drying of surfaces completely as shown in Figure 2a. The surface porosity also observed in Figure



PROCEDURE FOR COMPRESSIVE STRENGTH:

After curing is completed for specified period of time, the specimens are taken out of water and demoulded

The testing machine is cleaned and load is adjusted for 40KN/minute.

Before placing the specimen, adjust the plate to the height of specimen.

The specimen is placed into the machine.

Value is closed.

Load is applied on the cube at the rate of 40KN per minute until the cube is failed
Load at which the specimen fails is noted.



APPLICATIONS

- Low-volume pavements
- Residential roads, alleys, and driveways
- Sidewalks and pathways
- Parking areas
- Low water crossings
- Tennis courts
- Sub base for conventional concrete pavements
- Slope stabilization
- Well linings
- Hydraulic structures
- Swimming pool decks

RESULTS;

Mix Design	Fly Ash%	Cement	Fly Ash	Coarse Aggregate	W/C Ratio(0.40)	Compressive strength in days(N/sq.mm)		
						7	14	28
1:2 (8 Kg : 16 Kg)	15%	6.8 Kg	1.2 Kg	16 Kg	3.2 Lit	20.04	31.2	34.32
	35%	5.2 Kg	2.8 Kg	16 Kg	3.2 Lit	24.84	35.48	39.02
	40%	4.8 Kg	3.2 Kg	16 Kg	3.2 Lit	9.7	14.88	15.96
1:4 (4.5 Kg : 18 Kg)	15%	3.825 Kg	0.675 Kg	18 Kg	1.8 Lit	13.64	21.9	24.09
	35%	2.925 Kg	1.575 Kg	18 Kg	1.8 Lit	12.44	19.3	21.23
	40%	2.7 Kg	1.8 Kg	18 Kg	1.8 Lit	3.4	5.3	5.86



CONCLUSION:

- Pervious concrete pavement construction is an exceptionally good method to improve sustainability of construction. It effectively recharges the ground water and also helps in control of urban heat island effect. Even though compression strength is low, it can be used for light traffic roads, pavements, parking lots and paving the front of houses.

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