COMPARITIVE ANALYSIS ON VARIOU PROPERTIES OF PERVIOUS CONCRETE WITH CONVENTIONAL CONCRETE

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Abstract Pervious concrete is a special type of concrete with high porosity. it is used for concrete flatworks application that allow the water to pass through it, thereby reducing the runoff from a site and allowing ground water recharge. The high porosity is attained by a highly interconnected void content. Typically pervious concrete has water to cementisious material ratio of 0.28 to 0.4.The mixture is composed of cementisious materials, coarse aggregates and water with little to no fine aggregates. Addition of a small amount of fine aggregates will generally reduce the void content and increase the strength. The present project deals with the study and comparison of mechanical properties, workability density and permeability of different grades of pervious concrete(M25,M45).

Index Terms- pervious concrete, no fines, Fly ash

I. INTRODUCTION

One of the disadvantages of concrete is the high self weight of concrete. Density of normal concrete is in the order of 2200 to 2600 kg/m . This heavy self weight will make it to some extent an uneconomical structural material. Attempts have been made in the past to reduce the self weight of concrete to increase the efficiency of concrete as a structural material. The light weight concrete density varies from 300 to 1850 kg/m .Light weight concrete has become more popular in recent years and have more advantages over the conventional concrete. Pervious concrete is nothing but no fines concrete, which is also known as porous, gap graded or permeable concrete mainly consists of normal Portland cement, CA, water. In which FA are not existent or present in very small amount i.e < 10% by weight of the total aggregates.In general, for making porous concrete , we will use the aggregates of size which passes through 12.5mm sieve and retained on 10mm sieve. In this project we have taken single size aggregates i.e 12.5mm. the single size aggregates make a good no- fines concrete, which addition to having large voids and hence light in weight, also offers architecturally attractive look. Common applications for pervious concrete are parking lots, side walls, path ways, tennis courts, slope stabilization, swimming pool decks, green house floors, drains, highway pavements. Generally which is not used for concrete pavements for high traffic and heavy wheel loads. structural advantages.

The aim of the research is to study the strength, durability and permeability of pervious concrete for different grades(M25,M45). The objectives include

- To study the workability of concrete.
- To study the density of concrete.

- To study the mechanical properties such as compressive, tensile and flexural strength of concrete.
- To study the durability of concrete .
- To study the permeability of concrete.

II. MATERIAL AND METHODOLOGY

The present investigation the following materials were used: Ordinary Portland Cement of 53 Grade cement conforming to IS: 169-1989 Fine aggregate and coarseaggregate conforming to IS: 2386-1963.Water. Fly ash

Cement: Ordinary Portland Cement of 53 Grade of brand name Ultra Tech Company, available in the local market was used for the investigation. Care has been taken to see that the procurement was made from single batching in air tight containers to prevent it from being effected by atmospheric conditions. The cement thus procured was tested forphysical requirements in accordance with IS: 169-1989 and for chemical requirement in accordance IS: 4032-1988. The physical properties of the cement are listed in Table – 1

Table-1 Properties of cement

Sl. No	Properties	Test results	IS: 169-1989
1	Normal consistency	0.32	
2	Initial setting time	60min	Minimum of 30min
3	Final setting time	320min	Maximum of 600min
4	Specific gravity	3.14	

Fine Aggregates: River sand locally available in the market was used in the investigation. The aggregate was tested for its physical requirements such as gradation, fineness modulus, specific gravity in accordance with IS: 2386-1963.The sand was surface dried before use.

Table-2 Properties of fine aggregates

Fineness modulus	2.4
Specific Gravity of fine aggregate	2.74
Free moisture	2%

Coarse Aggregates:

Crushed aggregates of less than 12.5mm size produced from local crushing plants were used. The aggregate exclusively passing through 12.5mm sieve size and retained on 10mm sieve is selected. The aggregates were tested for their physical requirements such as gradation, fineness modulus, specific gravity and bulk density in accordance with IS: 2386-1963. The individual aggregates were mixed to induce the required combined grading. the particular gravity and water absorption of the mixture are given in table.

Table-3 Properties of coarse aggregates

Specific Gravity of coarse aggregate	2.74
Water absorption	1%

Water : Potable water fit for drinking is required to be used in the concrete and it should have pH value ranges between 6 to 9.

Flyash : The use of fly ash in portland cement concrete (PCC) has many benefits and improves concrete performance in both the fresh and hardened state. Fly ash use in concrete improves the workability of plastic concrete, and the strength and durability of hardened concrete. Fly ash use is also cost effective. When fly ash is added to concrete, the amount of portland cement may be reduced.

MIX PROPROTIONS

Table-4 Mix proportions for M25 grade of concrete

materials	Proportions for conventional(kg/m^3)	Proportions for Pervious concrete(kg/m 3)
Cement	437.77	437.77

Table-5 Compaction factor for conventional concrete and PERVIOUS concrete

GRADES OF CONCRETE	Slump cone test	
	CONVENTIONAL CONCRETE	Pervious CONCRETE
M25	7	12
M45	6	15

III. CONCLUSION

W The following conclusions are drawn based on the experimental investigations on compressive strength, split tensile, flexural, durability, permeability considering the environmental aspects" .

1. Pervious concrete has less strength than conventional concrete by 18.2% for M15, 14.5% for M20 and 12.6% for M25.
2. The tensile and flexural strength values are also comparatively lower than the conventional concrete by 30%.
3. Though the pervious concrete has low compressive, tensile and flexural strength it has high coefficient of permeability hence the following conclusions are drawn based on the permeability, environmental effects and economical aspects.
4. It is evident from the project that no fines concrete has more coefficient of permeability.
5. Hence, it is capable of capturing storm water and recharging the ground water. As a result, it can be ideally used at parking areas and at residential areas where the movement of vehicles is very moderate.
6. Further, no fines concrete is an environmental friendly solution to support sustainable

construction. In this project, fine aggregates as an ingredient has not been used. Presently, there is an acute shortage of natural sand all around. By making use of FA in concrete, indirectly we may have been creating environmental problems. Elimination of fines correspondingly decreases environment related problems.

7. In many cities diversion of runoff by proper means is complex task. Use of this concrete can effectively control the run off as well as saving the finances invested on the construction of drainage system. Hence, it can be established that no fines concrete is very cost effective apart from being efficient.

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