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COMPARITIVE ANALYSIS ON VARIOUS PROPERTIES OF PERVIOUS CONCRETE WITH CONVENTIONAL CONCRETE

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Abstract - *Pervious concrete is a form of lightweight porous concrete, obtained by eliminating the sand from the normal concrete mix. . The mixture is composed of cementitious materials, coarse aggregates and water with little to no fine aggregates. Addition of a small number of fine aggregates will generally reduce the void content and increase the strength. Typically pervious concrete has water to a cementitious material ratio of 0.28 to 0.4The effect of w/c ratio and aggregate size on the strength of pervious concrete is studied. It is revealed that the compressive strength increases as the water/cement ratio decreases up to optimum w/c ratio and with an increase in the volume of paste. It is observed that cement can be effectively replaced by fly ash which reduces the cost of pervious concrete.*

Key Words: pervious concrete, fine aggregate, coarse aggregate, fly ash, mix proportioning, compressive strength.

1.INTRODUCTION

The lightweight concrete density varies from 300 to 1850 kg/m. Lightweight concrete has become more popular in recent years and has more advantages over conventional concrete. In general, for making porous concrete, we will use the aggregates of the size which passes through 12.5mm sieve and retained on 20mm sieve. In which FA is not existent or present in very small amount i.e < 10% by weight of the total aggregates, also called porous concrete or enhanced porosity concrete is a macro-porous concrete that is gaining rapid popularity in many parts of the world because of its applications in sustainable constructions . no-fines pervious concrete for paving was found that, when compressive strength of the concrete was increased from 10.3 MPa to 17.2 MPa fine aggregate and water. Appropriate amounts of water and cementitious material are employed to create a paste that spaces between them. Clear for pervious concrete because unlike conventional content between the aggregate. Slump values are usually less than 20 mm. For quality control and quality assurance, unit weight or bulk density is preferred. coarse aggregates and little to no fine aggregates. The range of porosity that is commonly reported for pervious concrete is 15 to 30%, and this depends on the compaction method adopted, in addition to the mixture proportions. However, The compressive strength of the material can only reach about 20 to 30MPa. Such materials cannot be used as pavement due to low strength) In recent years, pervious concrete pavements have become increasingly popular as an effective storm water management device in areas that receive frequent and sometimes extensive rainfalls. The most popular as parking lots, residential roads, driveways, sidewalks .Parking areas properly designed and constructed will last 20-40years with little or no maintenance.

1. 1 AIM & OBJECT

The research aims 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,and flexural strength of concrete.

1.2 MATERIAL

Ordinary Portland cement of 53grade conforming to the requirements of IS: 169-1989 was used in the study.

Fine aggregate and coarse aggregate conforming to IS: 2386-1963.

Water .

The fly ash (Class F) used in the overall

investigation was brought from the thermal power plant, Nagpur. The specific gravity of fly ash was 1.92

2. MIX PROPROTIONS

Mix proportions for M25 grade of concrete

Material	Proportions for conventional(kg/m^3)	Proportions for PERVIOUS concrete(kg/m^3)
Cement	437.77	437.77
Fine Aggregates	795.28	2% Of coarse agg.
Coarse Aggregates	1002.15	1193.94
Water cement ratio by mass	0.45	0.45

Mix proportions for M45 grade of concrete

materials	Proportions for Conventional (kg/m^3)	Proportions for pervious concrete(kg/m^3)
Cement	583	583
Fine aggregates	631.29	4% Of coarse agg.
Coarse aggregates	1122.30	1113.75
Water cement ratio by mass	0.30	0.30

3.TEST RESULTS

3.1 WORKABILTY :

Results obtained from slump cone test showing that the workability of concrete

Table- Slump cone for conventional concrete and pervious concrete

GRADES OF CONCRETE	SLUMP CONE TEST	
	CONVENTIONAL CONCRETE	PERVIOUS CONCRETE
M25	7	12
M45	6	15

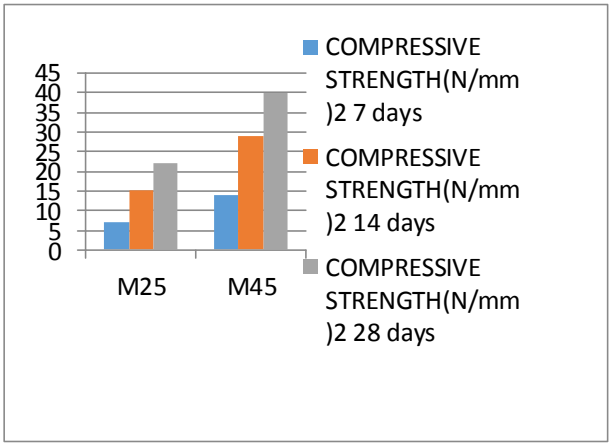
Table-1 Slump cone for conventional concrete and pervious concrete

3.2COMPRESSIVE STRENGTH

These results are obtained by testing the total 6 specimens for 7 days,14days and 28 days and by considering the average of the test results and that are tabulated in table

GRADES OF CONCRETE	COMPRESSIVE STRENGTH(N/mm^2)		
	7 DAYS	14DAYS	28DAYS
M25	7	15	22
M45	14	29	40

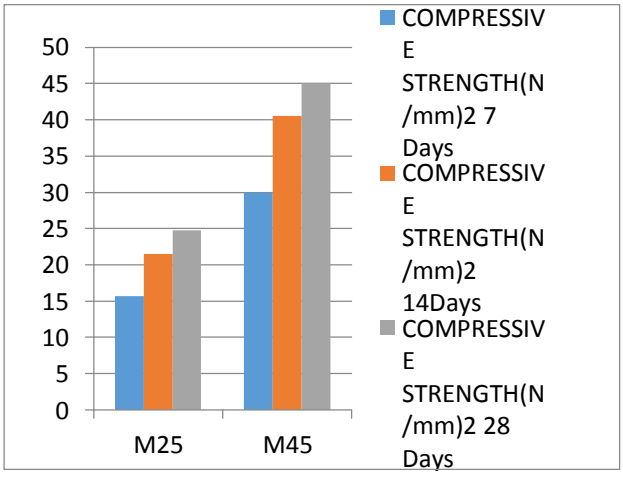
Table-2Compression strength of pervious concrete cubes cured in water



Graph-1COMPRESSIVE STRENGTH OF PERVIOUS CONCRETE

GRADES OF CONCRETE	COMPRESSIVE STRENGTH(N/mm²)		
	7 DAYS	14DAYS	28DAYS
M25	15.7	21.5	24.75
M45	30	40.5	45

Table- 3Compression strength of conventional concrete cubes cured in water



GRAPH-2COMPRESSIVE STRENGTH OF CONVENTIONAL CONCRET

4. Conclusion

The following conclusions are drawn based on the experimental investigations on compressive strength, permeability considering the environmental aspects" also

Pervious concrete has less strength than the tensile and flexural strength values are also comparatively lower than the conventional concrete by 30%.

The pervious concrete has low compressive, tensile and flexural strength it has a high coefficient of permeability hence the following conclusions are drawn based on the permeability, environmental effects and economical aspects. Hence, it is capable of capturing storm water and recharging the groundwater. As a result, it can be ideally used at parking areas and at residential areas where the movement of vehicles is very moderate.

Further, no fines concrete is an environmentally friendly solution to support sustainable construction. In this project, fine aggregates as an ingredient have not been used. Elimination of fines correspondingly decreases environment-related problems. In many cities diversion of runoff by proper means is a complex task. Use of this concrete can effectively control the runoff as well as saving the finances invested on the construction of the drainage system.

5.Refrance

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