EXPERIMENTAL STUDY ON PROPERTIES OF PERVIOUS CONCRETE

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Abstract

Pervious concrete (also called porous concrete, permeable concrete, no fines concrete and porous pavement) is a special type of concrete with a high porosity used for concrete flat applications allows water from precipitation and other sources to pass directly through, there by reducing the run-off from a site and allowing ground water recharge.

Pervious concrete is made using large aggregates with little to no fine aggregates. The concrete paste then coats the aggregates and allows water to pass through the concrete slab.

Pervious concrete is traditionally used in parking areas, areas with light traffic, residential streets, pedestrian walkways, and green houses. It is an important application for sustainable construction and is one of many low impact development techniques used by builders to protect water quality.

In this project the titanium dioxide was added to the pervious concrete mix in some percentage. Finally the compressive strength will be checked.

The main objective of this project is adding of titanium dioxide into the concrete to act as a smog absorbing agent.

CHAPTER – 1

INTRODUCTION

General:

The word “concrete” originates from the Latin word “concretus”, which means to grow together. Concrete is an important part of society’s infrastructure. Everyday life is greatly affected by concrete in numerous ways. It is a useful construction material and innovations are constantly being made in new types and applications for it.

Concrete is a very strong and versatile mouldable construction material. It consists of cement, sand and aggregate (e.g., gravel or crushed rock) mixed with water. The cement and water paste or gel which coats the sand and aggregate. When the cement has chemically reacted with water (hydrated), it hardens and binds the whole mix together. The initial hardening reaction usually occurs within a few hours. It takes some weeks for concrete to reach full hardness and strength. Concrete can continue to harden gain strength over many years.

Plain concrete posses a very low tensile strength, limited ductility and little resistance to cracking. Internal micro cracks are inherently present in the concrete and its poor tensile strength is due to the propagation of such micro cracks, eventually leading to brittle fracture of the concrete.

In plain concrete structural cracks (micro cracks) develop even before loading, particularly due to drying shrinkage or other causes of volume change.

Conventional concrete are made up of cement, fine aggregate, coarse aggregate, water without adding any admixture.

It has low tensile strength and little resistance for cracking. In brittle materials, structural cracks develop before loading, due to the cause of volume change. The width of these initial cracks exceeds a few microns but their other two dimensions may be of higher magnitude.

When loaded, the micro cracks propagate and open up, and owing to the effect of stress concentration, additional cracks form in places of minor defects.

The development of such micro cracks is in the main cause of inelastic deformations in concrete.

PERVIOUS CONCRETE:

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. Pervious concrete (also called porous concrete, permeable concrete, no fines concrete and porous pavement) 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 directly through, thereby reducing the runoff from a site and allowing groundwater recharge.

Figure 1.1 – Pervious concrete

Pervious concrete is made using large aggregates with little to no fine aggregates. The concrete paste then coats the aggregates and allows water to pass through the concrete slab. Pervious concrete is traditionally used in parking areas, areas with light traffic, residential streets, pedestrian walkways, and greenhouses. It is an important application for sustainable construction and is one of many low impact development techniques used by builders to protect water quality.

Pervious concrete was first used in the 1800s in Europe as pavement surfacing and load bearing walls. Cost efficiency was the main motive due to a decreased amount of cement. It became popular again in the 1920s for two storey homes in Scotland and England. It became increasingly viable in Europe after the Second World War due to the scarcity of cement. It did not become as popular in the US until the 1970s. In India it became popular in 2000.

The proper utilization of pervious concrete is a recognized Best Management Practice by the U.S. Environmental Protection Agency (EPA) for providing first flush pollution control and storm water management. As regulations further limit storm water runoff, it is becoming more expensive for property owners to develop real estate, due to the size and expense of the necessary drainage systems. Pervious concrete reduces the runoff from paved areas, which reduces the need for separate storm water retention ponds and allows the use of smaller capacity storm sewers. This allows property owners to develop a larger area of available property at a lower cost. Pervious concrete also naturally filters storm water and can reduce pollutant loads entering into streams, ponds and rivers.

Pervious concrete functions like a storm water infiltration basin and allows the storm water to infiltrate the soil over a large area, thus facilitating recharge of precious groundwater supplies locally. All of these benefits lead to more effective land use. Pervious concrete can also reduce the impact of development on trees. A pervious concrete pavement allows the transfer of both water and air to root systems allowing trees to flourish even in highly developed areas.

Pervious concrete consists of cement, coarse aggregate and water with little to no fine aggregates. The addition of a small amount of sand will increase the strength. The mixture has a water-to-cement ratio of 0.28 to 0.40 with a void content of 15 to 25 percent.

The correct quantity of water in the concrete is critical. A low water to cement ratio will increase the strength of the concrete, but too little water may cause surface failure. A proper water content gives the mixture a wet-metallic appearance. As this concrete is sensitive to water content, the mixture should be field checked. Entrained air may be measured by a Rapid Air system, where the concrete is stained black and sections are analyzed under a microscope.

A common flatwork form has riser strips on top such that the screed is 3/8-1/2 in. (9 to 12 mm) above final pavement elevation. Mechanical screeds are preferable to manual. The riser strips are removed to guide compaction. Immediately after screeding, the concrete is compacted to improve the bond and smooth the surface. Excessive compaction of pervious concrete results in higher compressive strength, but lower porosity (and thus lower permeability).

Jointing varies little from other concrete slabs. Joints are tooled with a rolling jointing tool prior to curing or saw cut after curing. Curing consists of covering concrete with 6 mil. plastic sheeting within 20 minutes of concrete discharge. However, this contributes to a substantial amount of waste sent to landfills. Alternatively, preconditioned absorptive lightweight aggregate as well as internal curing admixture (ICA) have been used to effectively cure pervious concrete without waste generation.

Pervious concrete has a common strength of 600 pounds per square inch (4,100 kPa) to 1,500 pounds per square inch (10,000 kPa) though strengths up to 4,000 pounds per square inch (28,000 kPa) can be reached. There is no standardized test for compressive strength. Acceptance is based on the unit weight of a sample of poured concrete using ASTM standard no. C1688. An acceptable tolerance for the density is plus or minus 5 pounds (2.3 kg) of the design density. Slump and air content tests are not applicable to pervious concrete because of the unique composition. The designer of a storm water management plan should ensure that the pervious concrete is functioning properly through visual observation of its drainage characteristics prior to opening of the facility. Concerns over the resistance to the freeze-thaw cycle have limited the use of pervious concrete in cold weather environments. The rate of freezing in most applications is dictated by the local climate. Entrained air may help protect the paste like in normal concrete. The addition of a small amount of fine aggregate to the mixture increases the durability of the pervious concrete. Avoiding saturation during the freeze cycle is the key to the longevity of the concrete. Related, having a well prepared 8 to 24 inch (200 to 600 mm) sub-base and drainage will reduce the possibility of freeze-thaw damage.

To prevent reduction in permeability, pervious concrete needs to be cleaned regularly. Cleaning can be accomplished through wetting the surface of the concrete and vacuum sweeping.

CHAPTER -2
LITERATURE REVIEW

R.A.Kavin, S. Jaya pradeep.,etal., Pervious concrete is a zero-slump, open graded material consisting of hydraulic cement, coarse aggregate, admixtures and water. Because pervious concrete contains little or no fine aggregates such as sand, it is sometimes referred to as “no-fines” concrete. It is a special type of concrete having a high void content of about 30%, is becoming popular nowadays due to its potential to reduce the runoff to the drainage systems which can provide a water flow rate around 0.34 cm/second. Pervious concrete has a large open pore structure hence less heat storage and faster. Pervious concrete also find its effective application in low loading intensity parking pavements, footpaths, walkways and highways. The pervious concrete is considered as an Environmental Protection Agency (EPA) for providing pollution control, storm management and suitable development. Here, pervious concrete mix is designed without sand and adding silica fume as an admixture using ACI 522R-06 code, the mechanical strength of the concrete is increased to an extent. The aim of this project is to lay the pervious concrete in platform and car parking thus transmitting the water to the underground surface very easily for maintaining the ground water table even in all the places.

Darshan S. Shah, Prof.J.J.Bhavsar.,etal., Pervious concrete is a relatively newconcept for rural road pavement, with increase into the problems in rural areas related to the low ground water level, agricultural problem. Pervious concrete has introduced in rural road as a road pavement material. Pervious concrete as a paving material has seen renewed interest due to its ability to allow water to flow through itself to recharge groundwater level and minimize storm water runoff. This introduction to pervious concrete pavements reviews its applications and engineering properties, including environmental benefits, structural properties, and durability.In rural area cost consideration is the primary factor which must be kept in mind. So that in rural areas costly storm water management practices is not applicable. Pervious concrete pavement is unique and effective means to meet growing environmental demands. By capturing rainwater and allowing it to seep into the ground. This pavement technology createsmore efficient land use by eliminating the need for retention ponds, swell, and other costly stormwater management devices.

Darshan S. Shah, Jayeshkumar Pitroda., Pervious concrete is a special high porosity concrete used for flatwork applications that allows water from precipitation and other source to pass through there by Reducing the Runoff from a site and Recharging Ground Water Levels. Durability and Water Absorption are important properties of Pervious Concrete. This paper represents the experimental methodology and experimental results related to durability and water absorption. Cylinders of size 100 mm Ø and 200 mm height are prepared to investigate both these properties. This investigation should be carried out at the end of 28 days for water absorption and 56 days for durability in which cylinders are immersed in Sodium Chloride (NaCl) Solution after 28 days of casting. Different concrete mix proportion such as 1:6, 1:8 and 1:10 with different size of gravel such as 18.75 mm and 9.375 mm should be used to check both these properties of pervious concrete. Test results indicates that pervious concrete made by 1:6 concrete mix proportion has more durability and less water absorption and pervious concrete made by 1:10 mix proportion has more water absorption and less durability that's why durability and water absorption are inversely proportional to each other.

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Praveenkumar Patil, Santosh M Murnal., Pervious concrete is a form of lightweight porous concrete, obtained by eliminating the sand from the normal concrete mix. The advantages of this type of concrete are lower density, lower cost due to lower cement content, lower thermal conductivity, relatively low drying shrinkage, no segregation and capillary movement of water. It has better insulating characteristics than conventional concrete because of the presence of large voids. In the present study M20 pervious concrete is designed by ACI522R-10 design code. The effect of w/c ratio and aggregate size on the strength of pervious concrete are studied. The property of pervious concrete by replacing cement by fly ash is also studied. It is revealed that the compressive strength increases as the water/cement ratio decreases up to optimum w/c ratio and with increase in volume of paste. It is observed that cement can be effectively replaced by fly ash which reduces the cost of pervious concrete.

An Cheng, Hui-Mi Hsu., etal., This paper investigates recycled aggregate (RA) obtained from construction waste, with a particular focus the properties of pervious concrete. We reveal the mechanical performance and permeability of pervious concrete with regard to volume fraction of the binder (binder/ voids between aggregate), type of binder (cement paste and styrene-butadiene latex modified paste), particle size of aggregate and aggregate to cement ratio. The three nominal diameters of the aggregate were 3.6 mm, 7.2 mm and 11.1 mm. The volume fraction of the binder ranged between 0.3 and 0.5, by varying the nominal diameter of the aggregate. We designed and cast concrete specimens with water to binder ratios (w/b) of 0.35. We conducted laboratory testing of mixture proportions for various properties, such as workability, unit weight, compressive strength, flexural strength, porosity and permeability. The results show that mechanical strength decreases as permeability increases. Decreasing the aggregate to the cement ratio enhances mechanical strength but may reduce permeability, and styrene-butadiene latex greatly enhances flexural strength. From an economic point of view, our recommendation to achieve optimal strength and permeability in pervious concrete using recycled coarse aggregate is: w/b=0.35, nominal diameter of 11.1 mm for the recycled aggregate; the volume fraction of 0.5 for the binder; and aggregate to cement ratio of 3.9. The permeability coefficient for the above mentioned mix was 0.33 cm/sec with the 28-day compressive strength and flexural strength reaching 12.6 MPa and 2.1 MPa, respectively. The mixture for RA pervious concrete developed in this study satisfies the typical requirement for concrete sidewalks and is thus applicable for civic paving projects.

Marai M. Alshihri, Ahmed M. Azmy, etal., neural networks procedures provide a reliant analyses in several science and technology fields. Neural networks is often applied to develop statistical models for intrinsically non-linear systems because neural networks behave the advantages of simulating complex behavior of many problems in this investigation the neural networks (NNs) are used to predict the compressive strength of light weight concrete (LWC) mixtures after 3,7,14,and 28 days of curing. Two model namely, feed forward back propagation (BP) and cascade correlation (CC), were used. The compressive strength was modeled as a function of 8 variables; sand, water / cement ratio, light weight fine aggregate, light weight coarse aggregate, silica fume used in solution, silica fume used in addition to cement, super plasticizer, and curing period. It is concluded that the CC neural network model predicated slightly accurate results and learned very quickly as compared to the BP procedure. The finding of this study indicated that the neural networks models are sufficient tools for estimating the compressive strength of LWC. This undoubtedly will reduce the cost and save time in the class of problem .

A.Mladenovic,J.S.Suput,etal., The possible use of waste glass for the production of lightweight aggregate has been studied. The aggregate ,in the form of highly porous granules,was produced by mixing together finely ground waste glass and an expansive agent and firing this mixture at a selected temperature.The expansive agent was chosen on the basis of the result of DTA/TGA experiment ,which were carried out on some selected agents and confirmed by using a hot – stage microscope,were the temperature interval of the expansion was also determined. Pilot production of about 0.5m3 of the aggregate was perfomed in a rotary kiln, and the water absorption and the bulk density of the aggregate so obtained were determined. Special emphasis was placed on the determination of the alkali-silica reactivity of the aggregate and the result of initial test for alkali- aggregate reaction were encouraging, given the high potential reactivity of the material. However, before such aggregate can be considered safe for the general use in concrete, longer-term concrete prism tests need to be carried out, which would cover the range of mixes in which the aggregate is likely to be used.

V.Sounder, V. Mahesh, etal., The compressive and the tensile strength of light weight concrete (LWC) of density 1700kg.m3 to 1800kg.m3 with different aluminium powder content were investigated using cylinder specimens. Based on an earlier investigation of the first two authors, cement to combined aggregate ratios of 1:6, 1:8, and 1:10 have been selected. Both sand and quarry dust have been tried as fine aggregate. Aluminium powder was added at 0.2%-0.8% by weight of cement. For that the ultimate strength of LWC is the range between 3 N.mm2-10.5N.mm2 for different aluminium powder content. Addition of more than 0.2% of aluminium powder reduces the compressive strength drastically.

K-J Byun, H-W Song, etal., Light weight foamed concrete is a concrete made by cement slurry mixed with pre-foamed foams so that foam concrete is lighter than conventional concrete. The objectives of this study is to develop optimal pre formed light weight foamed concrete possing improved lightness, flow ability and strength by using polymer foam agent, admixtures and industrial by- products such as Styrofoam, silica-fume and fly-ash. In this paper, extensive test data on light weight foamed concrete are presented. This paper also presents the mechanical characteristics of developed light weight foamed concrete including long-tems behaviours and their improvement, it is expected that this study provides an important guide to manufacture structural lightweight foamed concrete using polymer foam agent.

CHAPTER -3

3.1 METHODOLOGY

The methodology in the investigation is shown in fig. 3.1

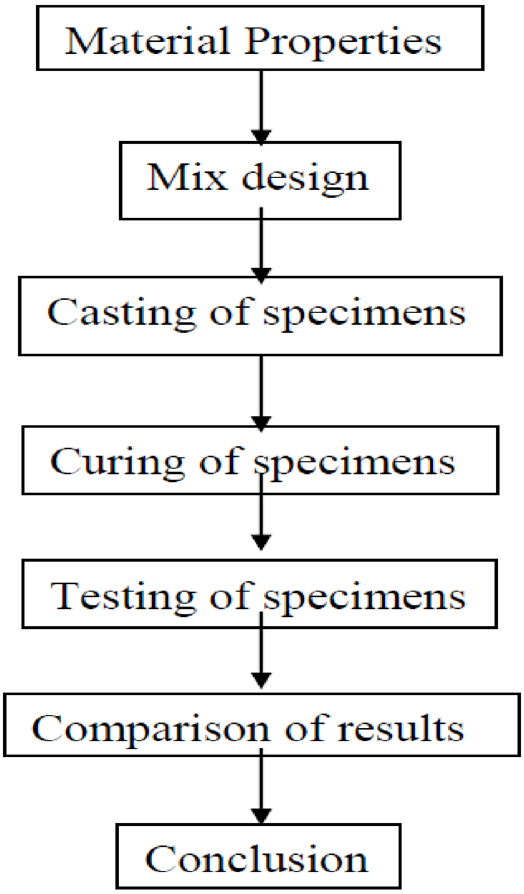


Figure – 3.1 Methodology

CHAPTER-4

MATERIAL PROPERTIES

CEMENT:

The cement used for casting the specimens is of 53 grade ordinary Portland cement. The required quantity is procured, stored in airtight bags and used for experimental programme. Portland cement is a hydraulic binder and a finely grained inorganic material when mixed with water, it forms a paste which sets and hardens by means of hydraulic reactions.

PROPERTIES OF CEMENT

Initial setting time – 30 min Final setting time – 185 min Specific gravity – 3.15

FINE AGGREGATE

Sand between 0.50 mm and 4.75 mm is called as fine aggregate. Fine aggregate consists of natural sand, crushed sand or crushed gravel stone dust. The sand used for casting the specimen is natural river sand. It should be hard, durable chemically inert, clean and free from organic matter. Very fine sand is not recommended for structural concrete. Very fine sand shows difficulties in surface finishing of concrete but provides good strength and more cohesion. The fine aggregate used for casting was sieved through IS 4.75m sieve.

PROPERTIES OF FINE AGGREGATE

Specific gravity - 2.67
Fineness modulus of sand - 2.80

COARSE AGGREGATE

Coarse aggregates are in the form of irregular broken stone or naturally occurring rounded gravel. The aggregates which are greater than 4.75mm are called as coarse aggregates. Aggregates are the important constituents in concrete. They give body to the concrete , reduce shrinkage and efficient in economy. Coarse aggregates for structural concrete consists of broken stones of hard rock like granite and lime stone or river gravels. They should be clean and if dirty should be washed well before using.

PROPERTIES OF COARSE AGGREGATE

Specific gravity - 2.77

Fineness modulus - 4.35

WATER

It is the least expensive but most important ingredient of concrete. It plays an important role in mixing, laying, compacting, setting and hardening of concrete. It influence the strength and durability of concrete. Water influence the strength development and durability of concrete. The pH value of water shall generally be not less than 6. Portable water available in the laboratory was used for making concrete.

CHAPTER-5
CONCRETE MIX DESIGN

(a) Design stipulations:

i. Characteristics compressive strength - 40 N/mm2 required in the field of 28 days

ii. Maximum size of aggregate - 20mm(angular)

iii. Degree of workability - 0.90 compacting factor

iv. Degree of quality control - Good

v. Type of exposure - Mild

(b)Test data for materials:

i. Specific gravity of cement - 3.15

ii. Specific gravity of coarse aggregates - 2.77

iii. Specific gravity of fine aggregates - 2.67

Water Absorption

i. Coarse aggregate - 0.50%

ii. Fine aggregate - 1.0%

Free (surface) moisture

i. Coarse aggregate - Nil

ii. Fine aggregate - 2.0%

Target mean strength of concrete:

$$\bar{f}_{ck} = f_{ck} + ts$$

$$= 40 + (1.65x5)$$

$$= 48.25 \text{ N/mm}^2$$

Selection of water-cement ratio:

The target mean strength of 48.25 N/mm2 is 0.40

IS 456, from table 5, maximum water cement-ratio=0.45 Adopt water cement ratio is 0.40

Selection of water and sand content:

Size of aggregate = 20mm (zone II)

Water content per cubic meter of concrete = 186 kg

Total aggregate by absolute volume = 40% Required water content = 196.23 kg

Determination of cement content:

W/C ratio = 0.40

Water = 196.23 litre/m

Cement = 196.23/0.40

= 490 kg/m^3

Determination of coarse and fine aggregate content:

$$V = [W + \frac{C}{Sc} + \frac{1}{P} \times \frac{fa}{sfa}] \times \frac{1}{1000}$$

$$0.98 = [196.23 + \frac{490}{3.15} + \frac{1}{0.315} \times \frac{fa}{2.60}] \times \frac{1}{1000}$$

$$f_a = 515.84 \text{ kg/m}^3$$

$$C_a = \frac{1-p}{p} \times fa \times \frac{sca}{sfa}$$

$$C_a = \frac{1-0.315}{0.315} \times 515.84 \times \frac{2.6}{2.6}$$

$$C_a = 1121.74 \text{ kg/m}^3$$

The mix proportion then becomes

Table-5.1 concrete mix design

Water	Cement	Fine aggregate	Coarse aggregate
196.23	490	515.84	1121.74
0.4	1	1.05	2.82

Concrete mix design = 1: 1.05 : 2.28

CHAPTER-6
EXPERIMENTAL INVESTIGATION
GENERAL:

An experimental investigation has been carried out on the cylinder specimens.

DIMENSIONS OF SPECIMENS:

CYLINDER - 150mmx300mm

This experiment consists of 24 specimens constituting three groups.

The conventional mix consists of 6 cylinders made up of conventional concrete.

The concrete mix consists of 18 cylinders casted in the ratio of 1:6, 1:8 and 1:10 for Pervious concrete.

PROCEDURE FOR FORMWORK:

The moulds are properly tightened using bolts and nuts in order to keep the alignment accurately. The mould is oiled before placing the concrete.

MIX PROPORTION:

A mix was designed as per IS 10262-1982 to achieve a minimum target strength of 40N/mm2. The different mix was used for Pervious concrete. The mix proportion was 1:6, 1:8 and 1:10. As different water cement ratios are used.

CASTING AND CURING:

The sides of the mould exposed to concrete were oiled well to prevent the side walls of the mould from the absorbing water from concrete and to facilitate easy removal of the specimen. The mould is arranged properly and placed over a smooth surface. The reinforcement were placed inside the moulds with bottom clear cover of 20 mm by providing cover blocks.

The concrete ingredients namely cement, fine aggregate, coarse aggregate, water are weighed accurately and mixed by hand mixing. The mixing was done till a uniform mix was obtained. The concrete immediately after mixing was filled in three layers in the mould and compacting using tamping rod.

The specimens were re moulded at the end of 24 hours of casting amd they are cured in water.

EXPERIMENTAL SETUP:

COMPRESSIVE STRENGTH:

The cylinder specimens are tested by compression testing machine after 28 days of curing. Place the specimen in the compression testing machine in such a manner that the load shall be applied to the opposite sides of the cast. Loads should be applied gradually at the rate of 140 kg/cm2 per minute till the specimen fails. Load at the failure divided by area of specimen gives the compressive strength of concrete.

Compressive strength = failure load(N) / cross sectional area(mm^2)

FIGURE – 6.1 COMPESSIVE STRENGTH TESTING MACHINE

TABLE - 6.1 COMPRESSIVE TEST IN CYLINDER (7 DAYS)

Compressive Test on Cylinder (7 Days)		
S.No	Sample	Ultimate stress
1	Conventional	13.2
2	Pervious Concrete (1:6)	8.56
3	Pervious Concrete (1:8)	7.78
4	Pervious Concrete (1:10)	7.03

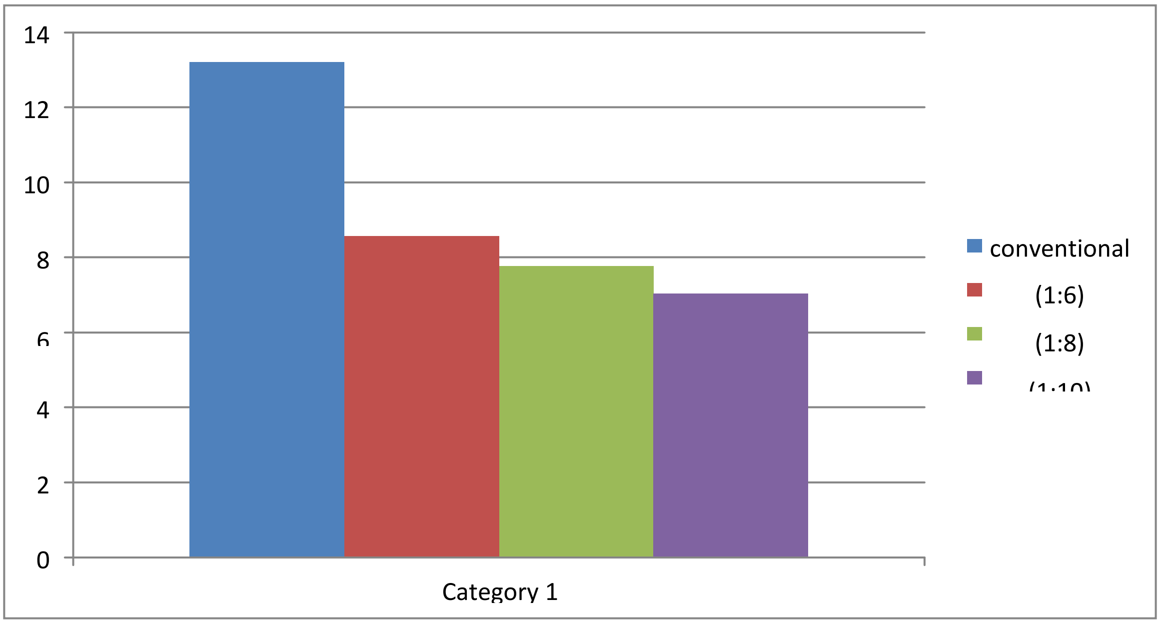


FIGURE – 6.2 COMPRESSIVE STRENGTH TEST IN CYLINDER (7 DAYS)

TABLE – 6.2 COMPRESSIVE STRENGTH TEST IN CYLINDER (28 DAYS)

Compressive Test on Cylinder (28 Days)		
S.No	Sample	Ultimate stress
1	Conventional	25.6
2	Pervious Concrete (1:6)	15.2
3	Pervious Concrete (1:8)	14.2
4	Pervious Concrete (1:10)	12.6

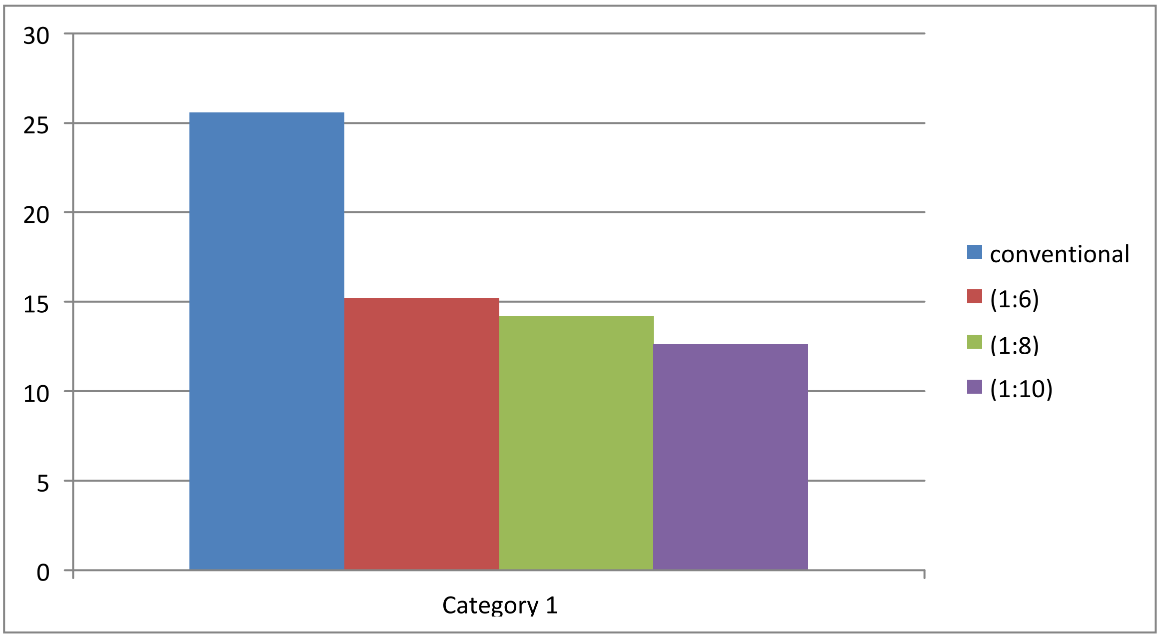


FIGURE - 6.3 COMPRESSIVE STRENGTH TEST IN CYLINDER

SPLIT TENSILE TEST:

The split tensile test were conducted as per IS5816:1999. The size of cylinder is 300mm length with 150mm diameter. The specimen were kept in water for curing for 7 days, 14 days and 28 days and on removal were tested in wet condition by wiping water and grit present on the surface. The test is carried out by placing a cylindrical specimen horizontally between the loading surfaces of a compression testing machine and the load is applied until failure of the cylinder along the vertical diameter. The maximum load applied to the specimen was then recorded and the appearance of the concrete for any unusual features in the type of failure was noted.

Average of three values was taken as the representative of batch. The test is carried out by placing a cylindrical specimen horizontally between the loading surfaces of a compression testing machine and the load is applied until failure of the cylinder along the vertical diameter.

To find split tensile strength following equationhas used.
Split tensile strength = 2P/ (π DL) Where :

P=split tensile load, D=diameter of the cylinder.

FIGURE - 6.4 SPLIT TENSILE TESTING MACHINE

TABLE – 6.3 SPLIT TENSILE TEST IN CYLINDER (7 DAYS)

Tensile Test on Cylinder (7 Days)		
S.No	Sample	Ultimate stress
1	Conventional	2.76
2	Pervious Concrete (1:6)	1.29
3	Pervious Concrete (1:8)	0.96
4	Pervious Concrete (1:10)	0.88

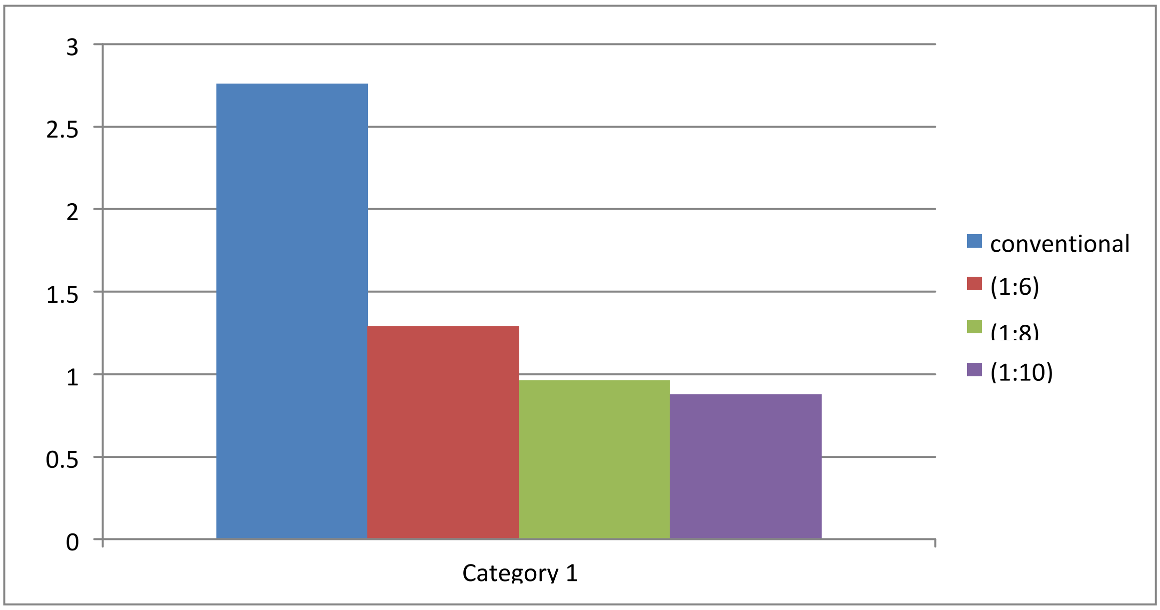
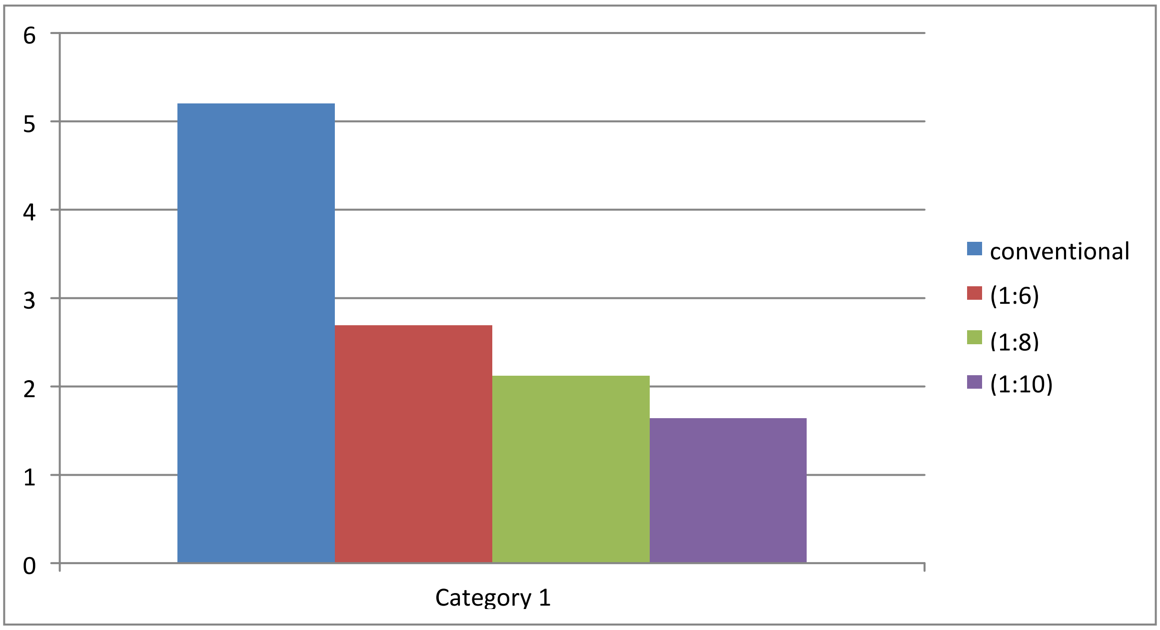


FIGURE – 6.5 SPLIT TENSILE TEST IN CYLINDER (7 DAYS)

TABLE – 6.4 SPLIT TENSILE TEST (28 DAYS)

Tensile Test on Cylinder (28 Days)		
S.No	Sample	Ultimate stress
1	Conventional	5.2
2	Pervious Concrete (1:6)	2.69
3	Pervious Concrete (1:8)	2.12
4	Pervious Concrete (1:10)	1.64

FIGURE – 6.6 SPLIT TENSILE TEST (28 DAYS)



Water Absorption Test:[IS: 2386 – (PART –III) 1963]

The 100 mm Ø * 200 mm height cylinder after casting will be immersed in water for 28 days curing. These specimens will then oven dried for 24 hours at the temperature 110°C until the mass became constant and again weighed.

This weight was noted as the dry weight (W1) of the block. After that the specimen will be kept in hot water at 85°c for 3.5 hours. Then this weight will noted as the wet weight (W2) of the block.

The percentage Water Absorption (WA) is calculated as follows.

% Water Absorption = [(W2–W1) / W1] x 100

Where,

W1 = Oven dry weight of the cylinder in grams

W2 = after 3.5 hour wet weights of cylinder in grams

TABLE – 6.5 WATER ABSORPTION TEST IN CYLINDER (7 DAYS)

Water absorption Test on Cylinder (7 Days)		
S.No	Sample	Ultimate stress
1	Conventional	1.03
2	Pervious Concrete (1:6)	0.12
3	Pervious Concrete (1:8)	0.36
4	Pervious Concrete (1:10)	0.54

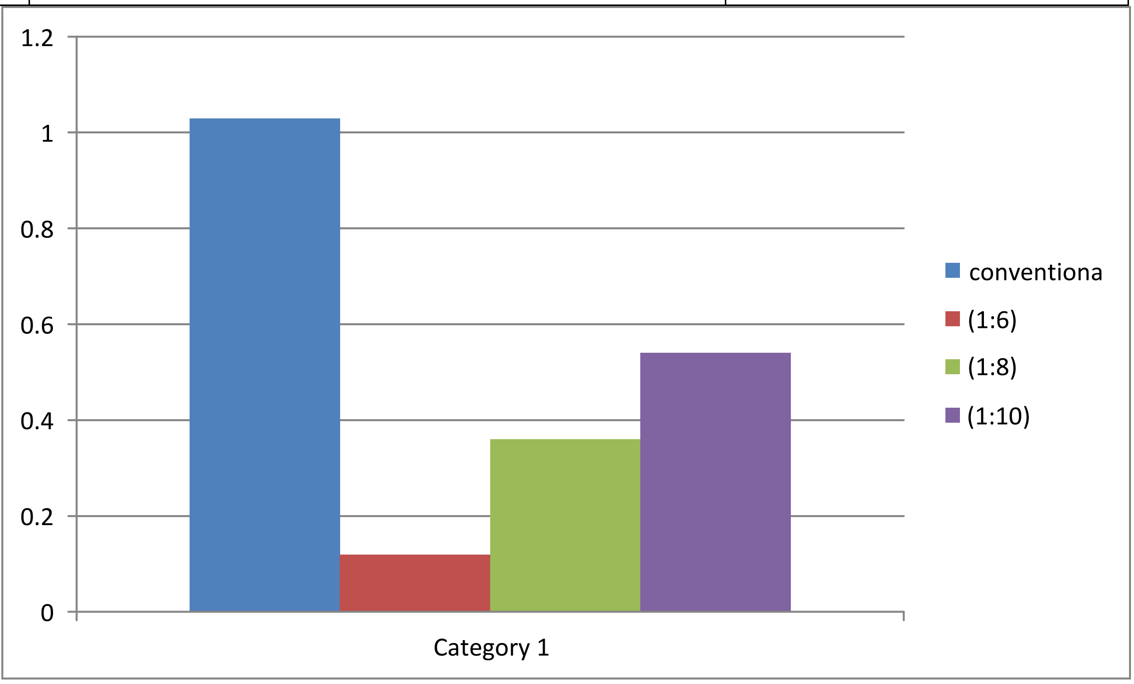


FIGURE – 6.7 WATER ABSORPTION TEST IN CYLINDER (7 DAYS)

TABLE – 6.6 WATER ABSORPTION TEST IN CYLINDER (28 DAYS)

Water absorption Test on Cylinder (28 Days)		
S.No	Sample	Ultimate stress
1	Conventional	2.26
2	Pervious Concrete (1:6)	0.29
3	Pervious Concrete (1:8)	0.55
4	Pervious Concrete (1:10)	0.68

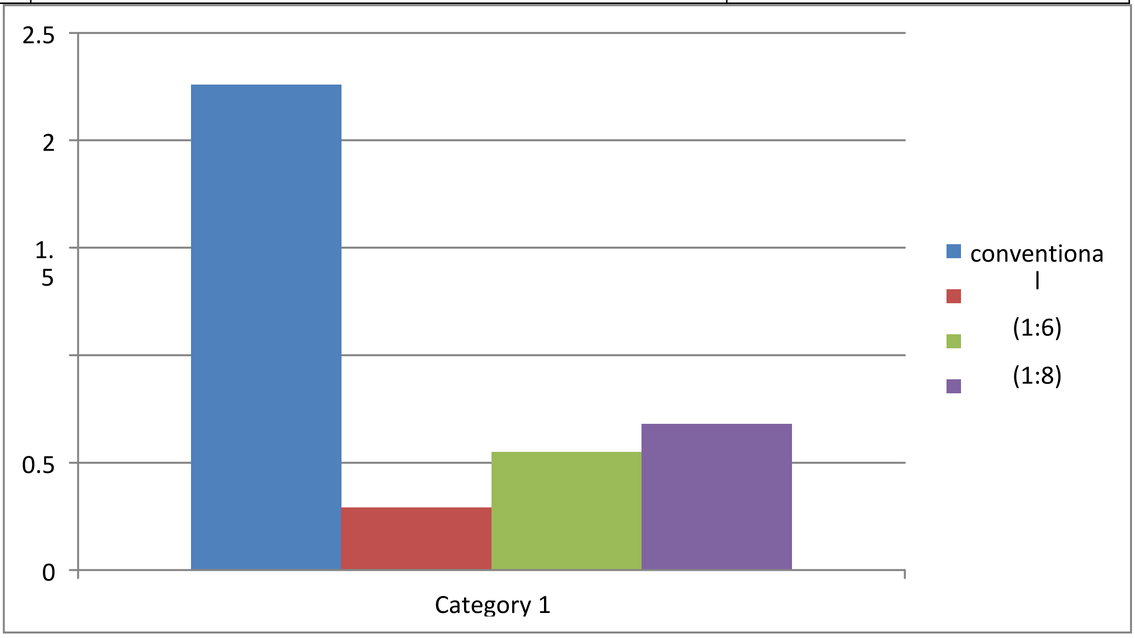


FIGURE – 6.8 WATER ABSORPTION TEST IN CYLINDER (28 DAYS)

CONCLUSION

Based on the investigation reported in earlier chapters, the following conclusions are drawn. They are summarized below.

The ultimate stress of compressive strength is 8.56 for 7 days and 15.2 for 28 days. The stress for split tensile test is 1.29 for 7 days and 2.69 for 28 days.

But the conventional concrete is greater when compared with this pervious concrete.

We are using this pervious concrete for road pavements to avoid water logging in roads during monsoon periods.

CHAPTER – 8

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