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A LITERETURE REVIEW PAPER ON: CHARACTERIZATION STUDIES ON PERVIOUS CONCRETE USING SOLID WASTE

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Abstract: The pervious concrete is called no fine concrete. The making of pervious concrete in use material is cement, coarse aggregate, fly ash, and with or without admixture. The pervious concrete is used for parking areas, street roads, and low laying areas where the traffic is not heavy. The pervious concrete can reduce amount of runoff water and can increase water quality. The pervious concrete can be used only for light volume traffic. The compressive strength of pervious concrete is low as compared to conventional concrete. The pervious concrete can be provide to storm water mitigation and increase ground water level. Pervious concrete is highly porous concrete and environmentally friendly material. It is also used for green building. The voids content in pervious concrete is 15-30%. This paper makes an attempt to put facts the pervious concrete and suitability of pervious concrete use in india.

Keywords: Pervious concrete, Environmentally friendly, Storm water, Drainage, Water table,

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INTRODUCTION

Pervious concrete is different from the conventional concrete. It is defined as "no fines concrete". The pervious concrete mix contains very little or practically no fine aggregate. Pervious concrete which is also known as the no-fines, porous, gap graded, and porous concrete and enhance porosity concrete has been found to be a reliable storm water management tool. By definition, pervious concrete is a mixture of gravel or granite stone, cement, water, little to no sand (fine aggregate) with or without admixtures. When pervious concrete is used for paving (Figure 1), the open cell structures allow storm water to filter through the pavement and into the underlying soils. In other words, pervious concrete helps in protecting the surface of the pavement and its environment. The infiltration rate of pervious concrete will fall into the range 80 to 720 liters/minute/square meter. (Mr.V. R. Patil)

Figure 1: Pervious Concrete
(Sources:http://www.tececo.com.au/images/photographs/ permecocrete/PerviousPavement.JPG)

Conventional normal cement concrete is normally used as construction material of buildings. The impervious nature of concrete gives to the improved water runoff into drainage system, over-burdening the infrastructure and causing too much flooding in built-up areas. Pervious concrete has become significantly popular during recent decades, because of its potential contribution in solving environmental issues.(Prof. DR K.B. Parikh1,March 2016)

PROBLEM STATEMENT

When we use the fly ash in partially replacement of cement then the compressive strength of pervious concrete is decrease. Than pervious concrete is only for using in parking lots, street road, and drainage purpose not use in highway purpose.The research proposes to study the influence of coarse aggregate Investigate the properties of pervious concrete with and without fly ash and demolition waste. Due to rapid urbanization most of the places are covered with

permeable surfaces like cement concrete. This has major impact on the ground water table. Pervious concrete is the effective way to minimize this issue. Pervious concrete is an open graded structure with inter-connected voids through which rain and storm water is permitted to percolate into the aquifers

OBJECTIVES & SCOPE

Objectives:

- Establish the experimental procedure to determine influence of coarse aggregate on the properties of pervious concrete by preparing different mix proportions with fly ash.
- Determine the optimum mix from Permeability and Compressive Strength and the performance of pervious concrete with fly ash,

Scope:

- The Calculation of various properties of mixes and their connection with fly ash.
- Experimental testing includes (with coarse aggregate).
- Total void in aggregates based on Angularity number.
- Compressive strength (flexural strength, split tensile strength, abrasion resistance) (Strength Characteristics and percentage of coarse aggregates).
- Penetrability of the pervious concrete mixtures.
- Total void in aggregate and permeability of pervious concrete.
- Total aggregate and Strength characteristics.
- Optimum Mix from permeability and compressive strength under both the options.

MATERIALS AND TEST

Cement

Ordinary Portland cement, 53-Grade conforming to IS: 269 – 1976.Ordinary Portland cement, 53-Grade was used for casting all the Specimens. Different types of cement have different water requirements to produce pastes of standard consistence. Different types of cement also will produce concrete have a different rates of strength development. The choice of brand and type of cement is the most important to produce a good quality of concrete. The type of cement affects the rate of hydration, so that the strengths at early ages can be considerably influenced by the particular cement used. It is also important to ensure compatibility of the chemical and mineral admixtures with cement. (M.HarshavarthanaBalaji, February 2015)

Coarse Aggregate

Nearby available crushed blue granite stones conforming to graded aggregate of nominal size 12.5 mm as per IS: 383 – 1970. Crushed granite aggregate with specific gravity of 2.77 and passing through 4.75 mm sieve and will be used for casting all specimens. Several investigations concluded that maximum size of coarse aggregate should be limited in strength of the composite. In addition to cement paste – aggregate ratio, aggregate type has a great influence on concrete dimensional stability. (M.HarshavarthanaBalaji, February 2015)

Fly Ash: Studied the effect of fly ash on self-compacting concrete properties. Portland cement was partially replaced with fly ash from 0-80%. Properties included workability, compressive strength, absorption and shrinkage were checked out. Based on tests and results they determined that High percentage of FA can be used to produce SCC with an acceptable strength. Using of up to 60% FA as PC replacement can produce SCC with a strength as high as 40N/mm2 and also water absorption rises with increase of FA content. Replacing cement with 80% FA can reduce the shrinkage by two third. J.m.khatib (2007)
Presented the strength properties of light weight concrete made with basaltic pumice and fly ash.in this research they made light weight concrete with replacement of 20% cement to fly ash on weigh basis. The compressive and flexural tensile strengths of hardened concrete, the properties of fresh concrete including density, and slump workability were measured. They decided that the use of fly ash, which will decrease the cost and environmental pollution, seems to be possible in SLWC mixture. It is possible to produce a lightweight concrete with 25MPa cylinder compressive strength by the use of fly ash. Ergal yasar (2003)

Water
Molding and curing of specimens were done with the clean water that is available in the buildings. (M.HarshavarthanaBalaji, February 2015)

We conducted test on aggregate is aggregate impact value test, elongation index test, flakiness index test. We will conducted a test of pervious concrete model is Slump testing, Compressive strength testing, permeability test.

SR.NO.	DETAIL OF SAMPLE	TRIAL -1	TRIAL - 2
1	Total weight of aggregate sample filling the cylinder measure =W1gm	1090gm	1070gm
2	Weight of aggregate passing 2.36mm sieve after the test=W2gm	100gm	300gm
3	Weight of aggregate retained 2.36mm sieve after the test=W3gm	990gm	770gm
4	Aggregate impact value =(W2/W1)*100%	9.17%	28.0%

[1] Observation Table: Aggregate impact value test

- Result: The mean Average impact value is 18.58 %

Passing through IS sieve mm	Retained on IS sieve mm	Thickness gauge(0.6 times the mean sieve) mm	Weight of the fraction consisting of atleast 200 pieces in gm.(W)	Weight of aggregate in each fraction passing thickness gauge gm.(w)
63	50	33.90		
50	40	27.00		
40	25	19.50		
31.5	25	16.95		
25	20	13.50		
20	16	10.80	01.37	0.28
16	12.5	08.55	02.38	0.69
12.5	10	06.75	01.01	0.33
10	6.3	04.89		

[2] Observation table: flakiness index test

❖ Result: The flakiness index of the given sample of aggregates is 27 %

Passing through IS sieve mm	Retained on IS sieve mm	Length gauge(1.8 times the mean sieve) mm	Weight of the fraction consisting of atleast 200 pieces in gm.(W)	Weight of aggregate in each fraction passing thickness gauge gm.(w)
63	50	-		
50	40	81.00		
40	25	58.50		
31.5	25	-		
25	20	40.50		
20	16	32.40	01.37	1.21
16	12.5	25.60	02.38	1.42
12.5	10	20.20	01.01	0.73
10	6.3	14.70		

[3] Observation table: Elongation index test

❖ Result: The elongation index of a given sample of aggregate is 81.43 %

RESULT AND DISCUSSION

❖ In pervious concrete the use of fly ash to slightly replacement of cement the making of pervious concrete cost is decrease. The disposal problem of waste material is can also reduce. We can also solved drainage problem in city area using pervious concrete. We test conducted on aggregate is impact value result is 18.58 %. The elongation index test result is 81.43 %. The flakiness index of the given sample of aggregates is 27 %. We future conducted test on pervious concrete is slump test, compressive test, and permeability test.

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