



Global Journal of Engineering Science and Research Management

EXPERIMENTAL STUDY ON WASTE GRANITE (IGNEOUS ROCK) IN CONCRETE

Praveen Singh*

* Gurukul Vidyapeeth Institute of Technology Banur

HOD of Civil Department, Gurukul Vidyapeeth Institute of Technology Banur

DOI: 10.5281/zenodo.2553459

KEYWORDS: granite powder, fine aggregate, durability properties, tensile and compressive strength etc.

ABSTRACT

The most commonly used fine aggregate used fine aggregate across world is river sand. River sand is expensive due to excessive cost of transportation from natural sources. Also large scale depletion of the source creates environmental problem. As environmental, transportation and other constrains make the availability and use of river and less attractive. A substitute or replacement product for concrete industry need to be found. The main parameter investigated in the study is M-40 grade admixture super plasticizer. This paper presents a detailed experimental study on compressive strength, spilt tensile strength 7, 14 and 28 days. Test results indicate that use of granite powder of admixtures in concrete has improved the performance of concrete in strength aspect.

INTRODUCTION

The maximum usually used nice aggregate is natural river sand. The international intake of natural river and is very because of the large use of concrete. In specific, the demand of natural river sand is pretty high in developed international locations thanks to infra-structural boom.

The non-availability of enough amount of normal river sand for making cement concrete is affecting the growth of construction enterprise in many countries.

On the opposite hand, the granite waste generated via the industry has amassed over years . India granite stone enterprise presently produce around 17.8 millions and thousands ton of stable granite waste , out of which 12.2 millions tons as rejects on the industries sites , 5.2 tons of millions heaps within the shape of slicing and trimming materials and 0.4 millions tons of granite slurry at processing and sprucing devices . The granite waste generated by the enterprise has gathered over years. Best insignificant quantities were utilized and the rest has been dumped unscrupulously resultant in surroundings hassle.

In the existing work , it's far geared toward the developing a brand new building cloth from the granite scrap an industrial waste as a replacement cloth of first-rate mixture in concrete . By doing so the objective of discount of value construction may be met and it'll help to overcome the hassle related to its disposal consisting of the environmental problem of the area. Accordingly to this paper we will observe the homes of concrete by means of varying the granite powder as a replacement of sand within the concrete which have originated from granite crushed unites at the side of superplasticiser water reducing agent.

SCOPE AND OBJECTIVE

To establish alternative for sand with partial use of waste granite powder. To examine the compressive strength, flexural and tensile strength the use of waste granite powder with the given design mix. To study the effect of use of waste marble dust at the mechanical properties of concrete.

Material

- A. Cement – The maximum not unusually cement utilized in an everyday Portland cement 43(OPC 43) changed into used, that is used for general concrete structure. The numerous check had been led on bond to determine closing putting time, fineness, soundness, particular gravity popular consistency and compressive test, particular gravity 3.15



Global Journal of Engineering Science and Research Management

- B. Fine Aggregates – In current, the high performance concrete mixes were prepared using available river sand. fineness modulus and specific gravity of the sand were found to be 2.56
- C. Coarse Aggregate Broken granite stones were used as a concrete aggregate in concrete. Size of the coarse aggregate used in the investigation was 10-12 mm. The specific gravity of the coarse aggregate was found to be 2.68.
- D. Water According Portable water was used for the training of the concrete specimens. The water used within the concreting paintings as nicely curing motive was the transportable water which is loose from impurities.
- E. Granite Powder – Granite belongs to igneous rock. The density of the granite is between 2.65g/cm² and the compressive strength will be greater than 200MPa. Granite powder obtained from the polishing units and the properties were found. Since the granite powder was fine, hydrometer analysis was carried out on the powder to determine the particle size distribution. From hydrometer analysis it was found that coefficient of curvature was 1.95 and the coefficient of uniformity was 7.82. The specific gravity of granite powder was found to be 2.5.
- F. Admixture – (1) Superplasticise was used investigation to improve the workability of concrete. As per Indian standards to dosage of superplasticiser should not exceed 2% by the weight of the cement. A higher dosage of superplasticiser may delay the hardening process. After trials, the optimal dosage of the superplasticizer was found to be 0.5% to produce slump of 100mm.

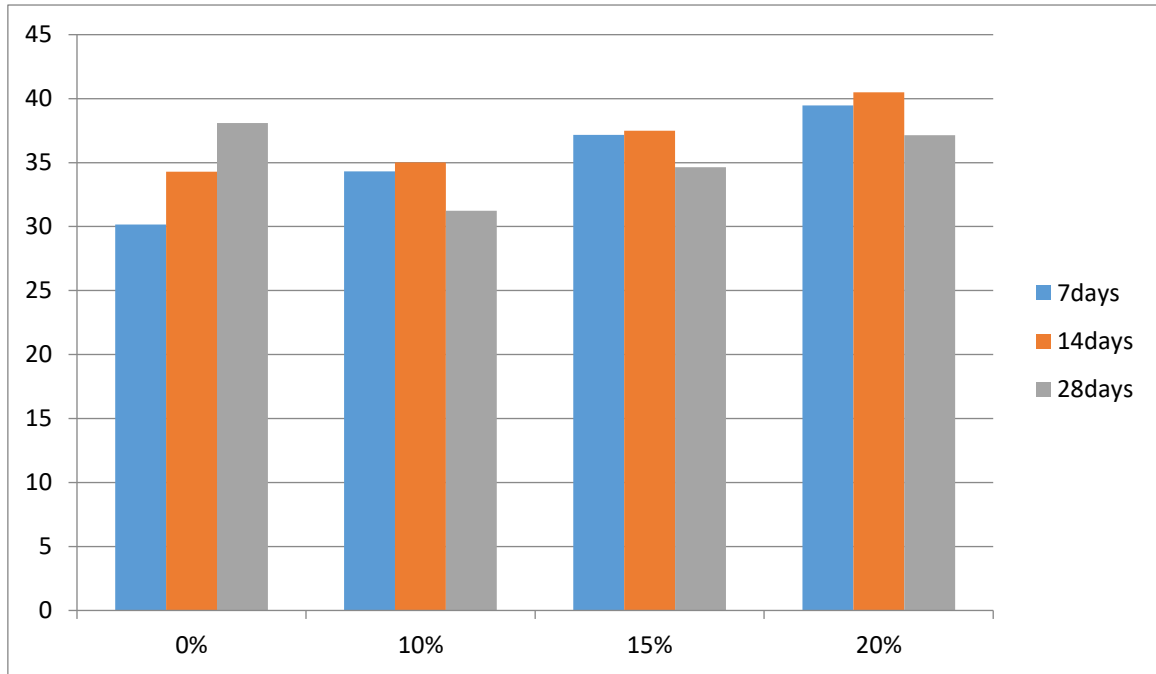
Mixing, Demoulding and Curing

Through mixing and adequate curing are most essential for achieving a good concrete. In the laboratory, the concrete was mixed in hand mixing. The mixing time was kept to about 3-4 min for normal concrete. Generally, the demoulding was done 24hr of casting. Potable water was used in curing all the concrete. All the concretes were kept in most environment immediately after the initial set and before the demoulding.

Compressive strength –

Concrete cubes conforming to IS: 516-1964 of size 150*150*150 mm we cast for assurance of compressive strength. After 24hr the concrete cubes became be placed for water curing for 7days, 14days and 28 days respectively. Before testing the cubes were air dried for 2hr, breaking loads were noted for 7days, 14days and 28days.

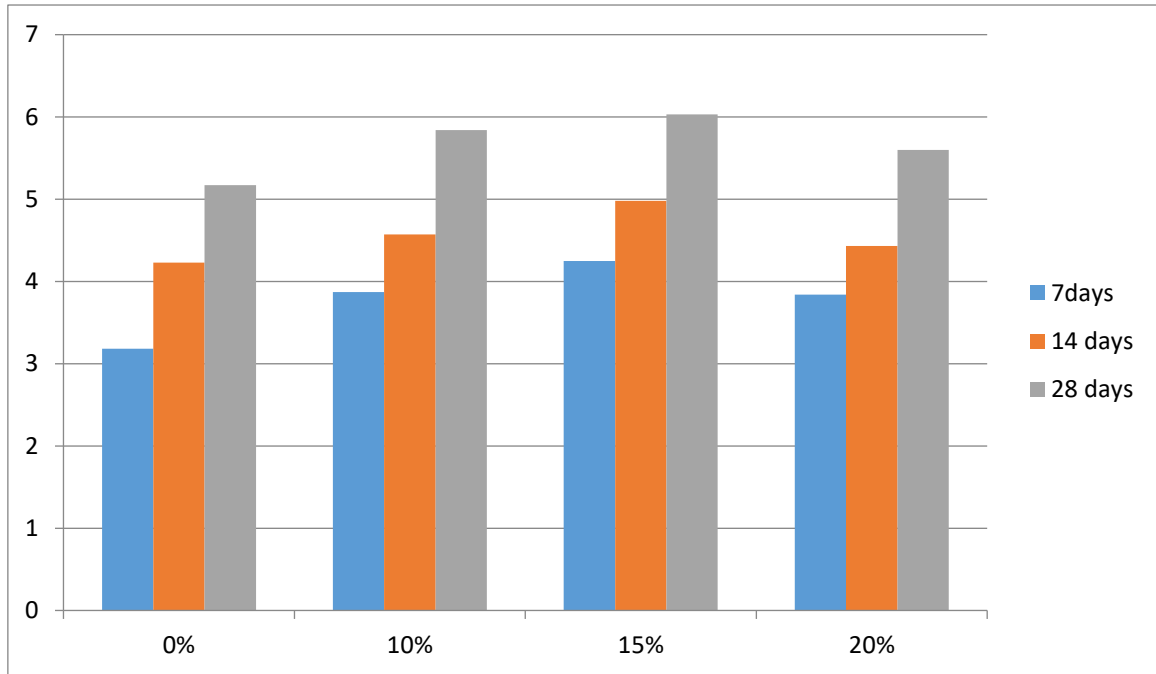
S.No	% of granite powder	Water absorption	Compressive Strength		
			7DAYS	14DAYS	28DAYS
1	0	0.38	30.17	34.30	38.1
2	10	0.38	34.32	35.02	31.23
3	15	0.38	37.16	37.48	34.65
4	20	0.38	39.48	40.5	37.14



SPILT TENSILE STRENGTH TEST

Tensile strength is second major properties for concrete. Size of test sample of 15cm diameter, 30cm height and 0.3cm thick cylindrical mould is used in the test. The cylinder is placed left and right between the two plates of the compressive testing and the load is applied on it. The load at which the sample in the end fails is noted and spilt tensile strength is calculated.

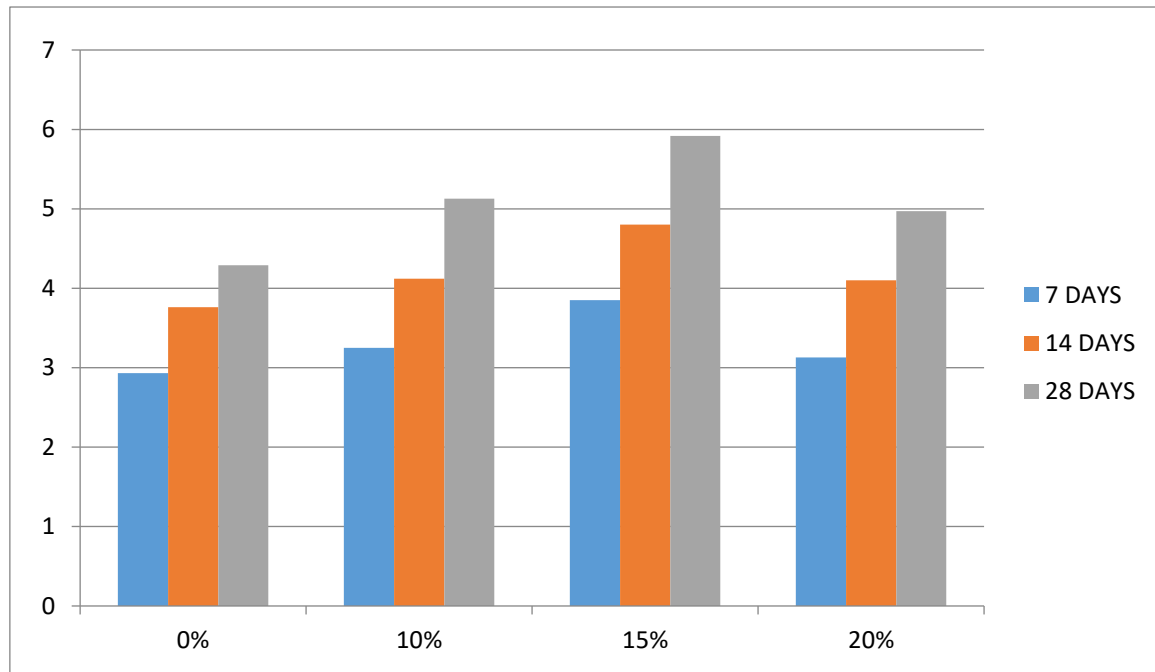
S.No	% of granite powder	Water absorption	Spilt Tensile Strength		
			7DAYS	14DAYS	28DAYS
1	0	0.38	3.18	4.23	5.17
2	10	0.38	3.87	4.57	5.84
3	15	0.38	4.25	4.98	6.03
4	20	0.38	3.84	4.43	5.6



FLEXURAL STRENGTH TEST

The beam is tested to check the flexural behavior of the hardened concrete. The test is carried out in a universal testing machine of 60T load ability. Standard beam of size 10cm*10cm*50cm were tested under one point loading to study the flexural strength of concrete. The maximum tensile stress discover at the failure of beam is known as modulus of rupture and is calculated.

S.No	% of granite powder	Water absorption	Flexural Strength		
			7DAYS	14DAYS	28DAYS
1	0	0.38	2.93	3.76	4.29
2	10	0.38	3.25	4.12	5.13
3	15	0.38	3.85	4.80	5.92
4	20	0.38	3.13	4.1	4.97



CONCLUSION

The aim of this research is to use useless material as a marble in a useful way. After the practically perform the following conclusion come out –

1. Up to 15% supplanting of sand waste granite powder there is an increase in all compressive quality of solid shape.
2. Usage of granite waste powder minimize the expenses for development.
3. The compressive quality of solid increment up to 15% substitution of sand by granite waste powder and further expanding of rate of granite waste powder prompt diminish in compressive quality of cement.
4. The compressive quality of cement for barrel increments up to 10% substitution of sand by granite waste powder.
5. The flexural quality of shaft increment upto 20% substitution of sand by granite waste powder.
6. Granite slime can creates less permeable cement with ordinary cement.
7. Usage of granite waste item prompts manageable improvement development industry.
8. The utilization of waste granite powder indicates superb execution because of effective smaller filling capacity
9. To save the earth, granite waste powder might be better substitution of sand in cement.

REFERENCESES

1. Kanmalai Williams C., Partheeban. P, Felixkala. T, 'Mechanical properties of high performance of concrete incorporating granite powder as fine aggregate' International Journal on Design and Manufacturing Technologies, vol.2, No.1,July 2008
2. M.G. Shaikh, S.A. Daimi 'durability of concrete made by using artificial sand with dust and natural sand , international journal of earth science and engineering ISSN 0974-5904, vol.04,No.06 SPL,Oct 2011,p823-825.
3. Adam Neville and Pierre-Claude Aticin (1998) High performance concrete an overview, Material Strcutres. 111-117.
4. Job T(2005) Utilization of quarry powder as a substitute for the river and in concrete.J. Structural Engg. 401-407



Global Journal of Engineering Science and Research Management

5. AdarshMinhas and Veena Uma Devi, Soil stabilization and alluvial soil by using marble powder. International Journal of Civil Engineering and Tevhnology, 7(5), 2016, pp.87-92.
6. Vaidevi c, "study on marble dust as partial replacement of concrete cement"Indain Journal if Engineering , volume 4 , No 9 july 2013
7. Mitchell DRG, Hinczak I and Day RA (1998) Interaction of silica fume and calcium hydroxide solution and calcium hydroxide solution and hydrated cement paste.
8. SP23 (1993) Handbook on concrete mixes. Bureau Ind.Std.New Delhi,India
9. Sway RN (1991) Mineral admixtures for high strength concrete.Ind. Concrete J. 265-271.
10. Job T (2005) Utilization of quarry powder as a substitute for the river sand in concrete.J.Structural Engg.401-407
11. Haque MN and Kayali o (1998) Properties of high strength concrete using a fine ash . Cement concrete Res.1445-1452.