

Study on Concrete Made With Gulbarga Bhagodi Sand and Shahpur Stones As Coarse Aggregates



Engineering

KEYWORDS : Bhagodi Black Sand, Compressive Strength, granitic stone, shahpur stone, shahpur sand.

Tanveer Asif Zerdi	Director, Professor & H.O.D Civil Engineering Dept, K.C.T.E.C, C/o Dr Meenaz hospital, H No 5-408/40/1&2, Near KBN Inst of Medical sciences, Madeena colony, Kalburgi.
Mohd Abdul Haseeb	U.G Student Dept of Civil Engineering, V.T.U University, K.C.T.E.C, Kalaburagi ,Karnataka.
Syed Abrar Hussaini	U.G Student Dept of Civil Engineering, V.T.U University, K.C.T.E.C, Kalaburagi ,Karnataka.
Ajmer Patel	U.G Student Dept of Civil Engineering, V.T.U University, K.C.T.E.C, Kalaburagi, Karnataka.

ABSTRACT

Utilization of natural resources and preservation of environment is the essence of any development. An attempt has been made to save the environment and utilize the material as replacement of coarse and in this project. The cost of construction and effective can be achieved by the proper study of materials and their properties. If some of the materials are found suitable in concrete making. In this paper, an attempt has been made to assess the suitability of Shahpur aggregate (Granite) in concrete making increasing the usage of local aggregate. The issue of natural coarse and depletion has been addressed by many technocrats who highlighted that the natural resource decreases while the demand for coarse aggregates usage in concrete production increases. An experimental study has been carried out on M20 concrete using Shahpur stone aggregates as replacement of coarse aggregate. Shahpur aggregate Conventional concrete cubes are casted and tested for 3,7,21,and 28 days of curing and the compressive strength development are

INTRODUCTION

Concrete is most widely used as manmade construction material in the world. It is obtained by mixing cementations materials, water and aggregate and sometimes admixtures in required proportions. The mixtures when placed in forms are allowed to cure and harden into a rock like mass known as concrete. The hardening is caused by chemical reaction between water and cement and it continues for a long time and consequently the concrete grows stronger with age. The strength, durability and other characteristics of the concrete depend upon the properties of its ingredients, on the proportions of mix, the method of compaction and other controls during placing, compaction and curing.

Bhagodi black sand is Chieply available sand in Gulbarga area. On account of the huge prices and legal hurdles of obtaining the river bedded good quality sand Engineers and various agencies are using this chieply available sand by replacing the good quality river bedded sand of Shahpur area. Currently India has taken a major initiative on developing the infrastructures such as express highways, power projects and industrial structures etc. to meet the requirements of globalization, in the construction of buildings and other structures concrete plays the right-ful role and a large quantum of concrete is being utilized. River sand, which is one of the constituents used in the production of conventional concrete, has become highly expensive and also scarce. In the backdrop of such a bleak atmosphere, there is large demand for alternative materials. Since on account of various constraints construction activities in this area of authors is carried out with the cheaply available mud mixed black colored sand which is known as bhagodi sand commonly over in this area. Due to digging of the sand from river bed reduces the water head, so less percolation of rain water in ground, which result in lower ground water level. There is erosion of nearby land due to excess sand lifting as well as it destroys the flora & fauna in surrounding areas. Utilization of river bedded good quality sand and its excavation generates the turbulence created by dredging sand near the estuaries could damage the fragile ecosystem along the coast.

II OBJECTIVES

The objective of this study is to investigate compressive strength of the concrete made with Black bhagodi sand of Gulbarga.

To study the compressive strength development of concrete made with the utilization of black bhagodi sand and to study the properties of black bhagodi sand.

To study the development of compressive strength in the normal concrete prepared by using good quality river bedded sand.

To compare the compressive strength development of concrete prepared by using black bhagodi sand available in Gulbarga and good quality river bedded sand avaialbe in Gulbarga.

MIX DESIGN OF M20 GRADE CONCRETE

A. Mix Proportions:

- Cement = 350.0 kg/m³
- Water = 192.0 liters
- Fine Aggregates = 688.0 kg/m³
- Coarse Aggregates = 1295.0 kg/m³
- Admixtures = 0 kg/m³
- Water Cement Ratio = 0.55
- Therefore,
- Water: Cement: Fine Aggregate: Coarse Aggregate
- 0.55: 1: 1.965: 3.70

III. Materials and methodology

CEMENT

The common OPC 53 grade cement is used. The physical properties of the cement tested according to standard procedure conform to the requirement of IS 12269:1989

Table 1 Physical properties of Cement.

S.No	Characteristics	Value obtained experimentally
1	Standard Consistency	33%
2	Fineness (90 micron sieve)	3%
3	Initial setting time	30 minutes
4	Specific gravity	3.0

FINE AGGREGATES

Locally available good quality river sand passing through 4.75mm sieve conforming to the recommendation of IS383-1970 was used.

Table 2 Physical properties of Fine Aggregate River bedded sand

S. No	characteristics	Value obtained experimentally
1.	Fineness modulus	2.68
2.	Specific gravity	2.68

FINE AGGREGATES

Locally available river sand passing through 4.75mm sieve conforming to the recommendation of IS383-1970 was used.

Table 2 Physical properties of Fine Aggregate Bhagodi black sand

S. No	characteristics	Value obtained Experimentally
1.	Fineness modulus	2.68
2.	Specific gravity	2.72

COARSE AGGREGATE (GRANITE): Locally available coarse aggregate retaining on 4.75mm sieve of granite stone is used , and also granitic shahpur coarse aggregates are used.

The aggregate size of 20mm, crushed angular shape and free from dust is used. The fineness

modulus and the specific gravity is 2.8 and 6.3.The impact value is 7.12% respectively.

Table 3 Physical properties of Coarse Aggregate (Basalt stone)

S.NO	Characteristics	Value obtained experimentally
1.	Fineness modulus	7.73
2.	Specific gravity	2.59

Water

Potable water suitable for drinking purpose available in the campus of KCT Engineering college is utilised in the preparation of concrete.

Methodology

The basic tests required on the ingredients of concrete were carried out. Thereafter the mix design of the concrete is done. Then in the material testing laboratory and concrete technology laboratory of KCT Engineering college Gulbarga the mixing of the concrete is done. Concrete cubes of 15cmx15cmx15cm sizes were prepared and cured for 3,7,21, and 28 days of curing is carried out. Then these blocks are removed from the curing tank and tested for compressive strength in Compression testing machine of building material testing laboratory of KCT Engineering college Kalburgi. The results of compressive strength are tabulated in proper tabular columns.

Concrete is prepared is of two types.

1. By using sand of good quality in concrete in place of fine aggregates in concrete, which is termed by the authors over here as the Normal concrete.

2. The concrete prepared by using the black bhagodi sand of gulbarga in place of fine aggregates in concrete, and granitic shahpur stones as coarse aggregates, for new concrete.

IV. RESULT AND DISSCUSION

Table 5 Compression strength of Concrete cubes in Normal concrete in N/mm²

% of different sands in concrete	3 days	7days	21 days	28days
Good quality sand	10.54	17.78	24.02	26.34

From the above tabular Colum we can notice that the strength development of normal concrete that is concrete made with the utilization of good quality sand which is available in Gulbarga area are 10.54 N/mm²,17.78 N/mm²,24.02 N/mm² and 26.34 N/mm² at 3,7,21,28 days of curing respectively.

Table 5 Compression strength Normal concrete in N/mm² of bhagodi sand and granitic shahpur coarse aggregates.

% of different sands in concrete	3 days	7days	21 days	28days
Good quality sand	8.75	14.22	19.68	21.65

From the above tabular Colum we can notice that the strength development of bhagodi sand and shahpur areas granitic coarse aggregates in concrete that is concrete made with the utilization of bhagodi sand which is available in Gulbarga area are 8.75 N/mm², 14.22 N/mm²,19.68N/mm²,21.65 N/mm² at 3,7,21,28 days of curing respectively.

The black Bhagodi sand which is far cheaper than the good quality sand (Shahpur sand) is also good for the manufacturing of concrete because the strengths variations in between two types of concretes prepared with the above sands are not much. Beside this the compressive strength development in the bhagodi sand concrete which is cast for M20 grade of sand concrete which is cast for M20 grade of concrete are quite a good.

V. CONCLUSIONS

From the above tabular column values the following conclusions are drawn In the concrete made with bhagodi black sand which is black in colour and shahpur areas coarse aggregates, the following results of compressive strengths are obtained. 8.75 N/mm², 14.22 N/mm²,19.68N/mm²,21.65 N/mm² at 3,7,21,28 days of curing respectively.

In the concrete made with the utilization of good quality sand that is shahpur sand which is costly available in the Gulbarga which is called by authors as normal concrete are 10.54 N/mm²,17.78 N/mm²,24.02 N/mm² and 26.34 N/mm² at 3,7,21,28 days of curing respectively.

The black Bhagodi sand which is far cheaper than the good quality sand (Shahpur sand) is also good for the manufacturing of concrete because the strengths variations in between two types of concretes prepared with the above sands are not much. Beside this the compressive strength development in the bhagodi sand concrete which is cast for M20 grade of concrete are

quite a good, sufficient enough to be utilised in the construction of structures.

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