



Experimental Investigation on Quarry Dust as a Partial Replacement of Sand for Concrete

Vikram Prajapati¹, Anant Bharadwaj², Ankita Agnihotri³, Siddharth Pastariya³

¹ PG Student, Dept. of Civil Engineering, Sri Aurobindo Institute of Technology, Indore, M.P, India

²Head of Dept. of Civil Engineering, Sri Aurobindo Institute of Technology, Indore, M.P, India

³Asst. Prof. Dept. of Civil Engineering, Sri Aurobindo Institute of Technology, Indore, M.P, India

ABSTRACT-

The purpose of starting this investigation is due to the fact that now the natural sand conforming the Indian standard has become rare due to its non-availability in time and due to the unavailability of land law, illegal dredging by river mafia, non-ratification with the IS 383-1970.

To increase the strength of the concrete, the stone dust will be presented as a partial replacement of the fine aggregate in M40 concrete mix with water reducer admixture. The strength parameters such as compressive strength, flexural strength and split tensile strength of the casted cubes, beams and cylinders will be tested respectively. Cubes cylinders and beams will be casted by a partial replacement of natural fine aggregate in concrete mix and quarry dust will be used as a fine aggregate. then test data of quarry dust concrete will be compared with test data from a standard concrete without quarry dust

Keywords: *Quarry dust concrete, Fine aggregate, Concrete, Compressive Strength, Flexural Strength, Split Tensile Strength, Workability.*

I. Introduction

These days, the most commonly utilised material is concrete. Concrete is made up of four ingredients: water, binding substance, fine and coarse mixtures. River sand, one of these components that is frequently used as fine aggregate in concrete, is become harder to find and therefore more expensive to utilise because it is more expensive to transport from natural sources. Quarry dust, a byproduct of crushing stone plants, is employed in this experimental investigation in place of sand.

II. Objective

- * To check the plastic behaviour of the QDC green concrete by workability test.
- * To check the behaviour of quarry dust concrete QDC under compression, split tensile test & flexure test.
- * To investigate the effect of quarry dust, super plasticizer & fly ash on the behaviour of QDC.

III. Experimental work

Materials:

Cement: Ordinary Portland cement of 43 Grade was used for making concrete.

Coarse Aggregate: Good quality of aggregate as coarse aggregate were used in the present work.

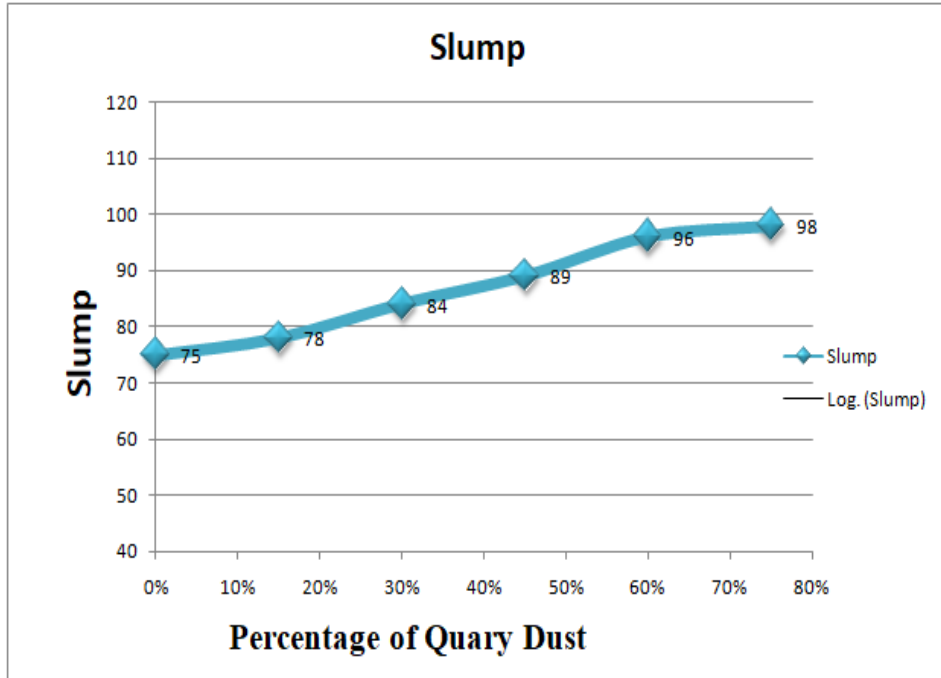
Water: The water available in the premises of SAIT, Madhya Pradesh, India, conforming to requirements specified by IS: 456-2000 was used as mixing water as well as for curing of concrete specimens. BIS:456-2000 (Reaffirmed 2011)

Quarry Dust: Quarry dust from local quarry was used for experiment.

IV. Results & Discussion

Workability:

Batch Mix	Percentage of Quarry Dust	Percentage of sand	Slump (mm)
Mix-01	0%	100%	75
Mix-02	10	90%	78
Mix-03	20	80%	84
Mix-04	30	70%	89
Mix-05	40	60%	96
Mix-06	50	50%	98



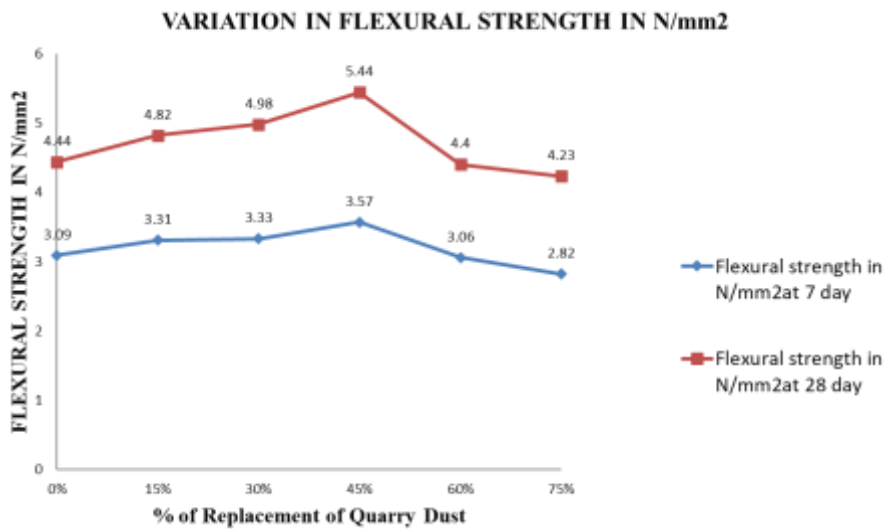
Graph 1: Variation in Slump value

Compressive Strength:

% of QD	0%	15%	30%	45%	60%	75%
7 Days	32.07 Mpa	32.96 Mpa	33.62 Mpa	34.16 Mpa	30.21 Mpa	28.81 Mpa
28 Days	44.81 Mpa	45.70MPa	47.18MPa	48.81MPa	44.22MPa	43.88MPa

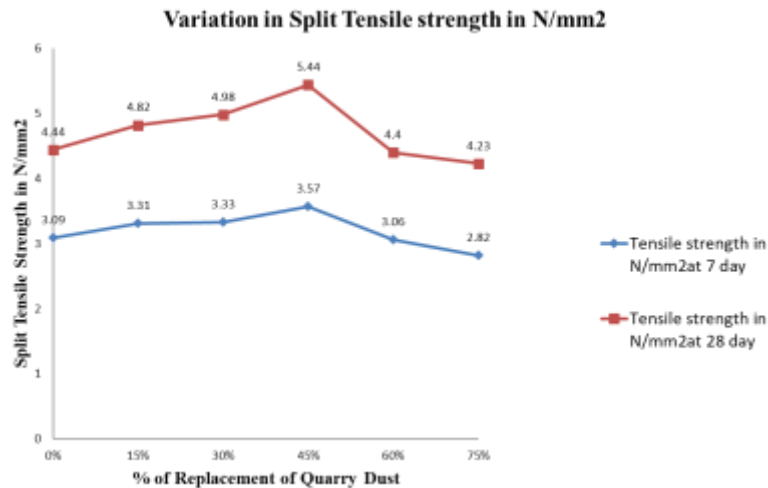
Split Tensile Strength:

Variation in flexural strength in N/mm² with age						
% of QD	0%	15%	30%	45%	60%	75%
7 Days	3.09MPa	3.31 Mpa	3.33MPa	3.57 MPa	3.06MPa	2.82MPa
28 Days	4.44MPa	4.82MPa	4.98MPa	5.44MPa	4.40MPa	4.23MPa



Flexural Strength:

Variation of Split Tensile strength with age						
% of QD	0%	15%	30%	45%	60%	75%
7 Days	2.62 MPa	2.87MPa	3.28MPa	3.33MPa	2.69MPa	2.43MPa
28 Days	4.70MPa	5.10MPa	5.26MPa	5.64MPa	4.60MPa	4.48MPa



V. Conclusion

Quarry dust as a F.A. increased the concrete slump and the flow of the concrete mixture, because the demand for water was reduced due to the surface area of the quarry dust but it did not affect the unit weight and air content of fresh concrete.

The strength gained has been determined of quarry added concrete with addition of 20%, 30%, 40%, 50% & 60% for M40 grade as a partial replacement of sand in conventional concrete. After performing all the tests and analyzing their result, the following conclusions have been derived:

- A) Workability of concrete increases as proportion of quarry dust increases.
- B) Maximum compressive strength was observed when quarry dust replacement is about 40%.
- C) Maximum split tensile strength was observed when quarry dust replacement is about 40%.
- D) Maximum flexural strength was observed when quarry dust replacement is about 40%.

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