

## **PERAMETRIC STUDY OF REGIONAL SAND (AJI SAND, BHOGAVO SAND) FOR R.C.C.**

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**Abstract-** The parametric study includes proportions of both sands (Aji and Bhogavo) and their combination in different proportion to improve gradation as required by I. S. Code. The study shows the combined gradation improve strength and workability of concrete. The experimental study carried out to on different proportion 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90% and 100% along with control mix to check effect on compressive strength, split tensile strength and flexural strength. The results are useful for application as per availability of sand.

**Keywords-** Black(Aji) sand zone-I, Red(Bhogavo) sand zone-II, Sieve analysis, Concrete, Compressive strength

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### **I. INTRODUCTION**

Currently India has taken a major initiative on developing the infrastructures. The most important construction material is concrete. For the purpose of made of concrete, two types of sand generally used in saurashtra-gujarat region, Aji sand and Bhogavo sand from River bed, which is one of the constituents used in the production of concrete, has become highly expensive and also scarce. Natural sand is excavated from river bed impacts on environment in many ways. In our region Aji(Black) sand and Bhogavo (Red) sand are must be used in R.C.C. work.

Due to limited supply of Aji sand at Gujarat region say for example Ahmedabad, Vadodara, Gandhinagar etc., cost is high and its consistent supply cannot be guaranteed. Same as it is due to limited supply of Bhogavo sand, at Saurashtra region say for example Morbi, Tankara, Upleta, Amreli etc., cost is high and its consistent supply cannot be guaranteed.

Due to scarcity on both the sand in different region, the study aim to utilize best proportion by trial mix and different test performed to check its suitability.

### **II. OBJECTIVE AND SCOPE OF STUDY**

The experimental programme comprises the following objectives and scopes:

- i) To suggest proportion of Black sand zone-I and Red sand zone-II for its gradation.
- ii) To study compressive strength improvement in concrete using varying proportion of Black sand zone-I and Red sand zone-II with varying water cement ratio.

### **III. EXPERIMENTAL INVESTIGATION**

- i) Gradation test on both the sand and determination of zone, Fineness Modulus of Black sand zone-I and Red sand zone-II.
- ii) Combine gradation in different proportion Black sand zone-I and Red sand zone-II. (i.e., 0 to 100%). (As per IS: 383:1970)
- iii) Compressive strength test on cement concrete cube (15cm X 15cm X 15cm) with different proportion of Black sand zone-I and Red sand zone-II with different W/C ratio. (i.e. 0.55, 0.50, 0.45)



Figure1. Compressive strength test

#### IV. EXPERIMENTAL RESULT

Table 1: Sieve Analysis of different proportion of Sand

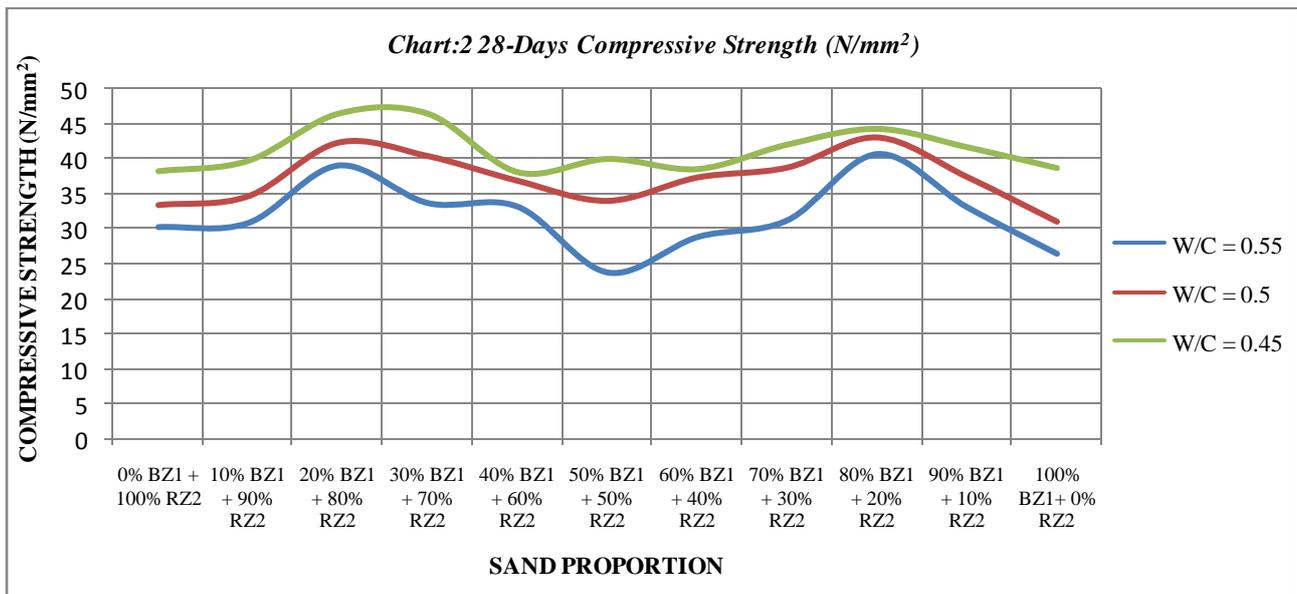
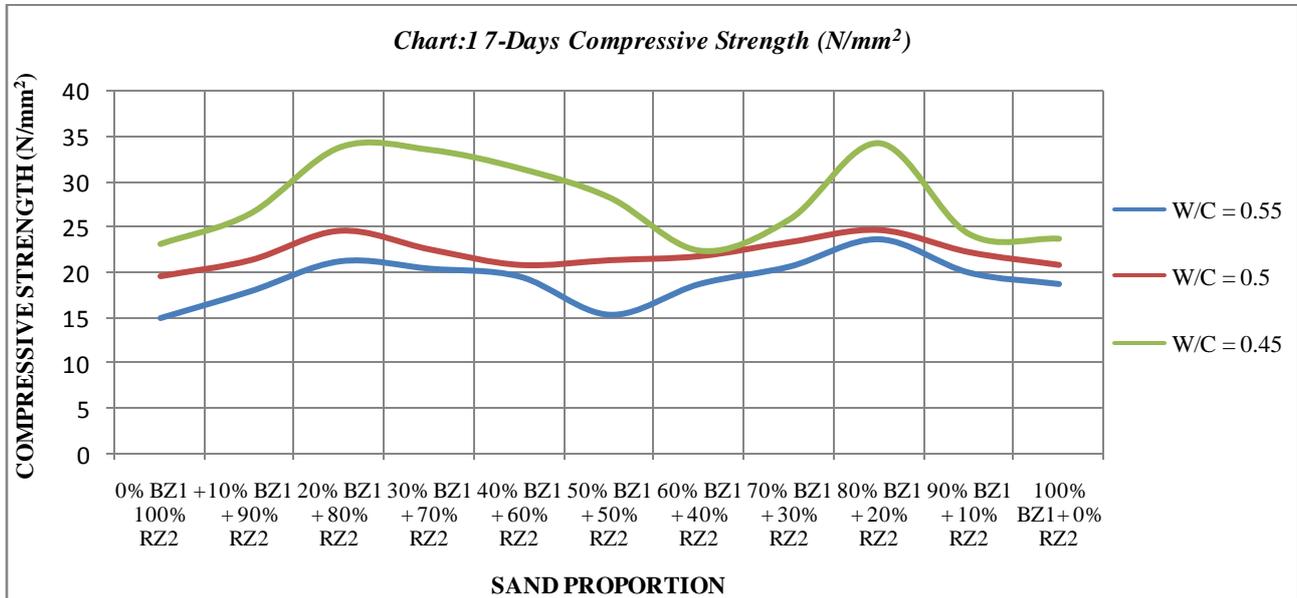
Sieve size	0% BZ1 + 100% RZ2	10% BZ1 + 90% RZ2	20% BZ1 + 80% RZ2	30% BZ1 + 70% RZ2	40% BZ1 + 60% RZ2	50% BZ1 + 50% RZ2	60% BZ1 + 40% RZ2	70% BZ1 + 30% RZ2	80% BZ1 + 20% RZ2	90% BZ1 + 10% RZ2	100% BZ1 + 0% RZ2
10mm	0	0	0	0	0	0	0	0	0	0	0
4.75mm	0	0	0	0	0	0	0	0	0	0	0
2.36mm	92.4	92.6	94	92.8	93.6	91.8	91.8	82.8	96.8	90.2	87.4
1.18mm	77.2	73.4	77.8	72.2	73.4	66.8	60.6	47.2	68.6	56.6	45
600micron	44	38.8	47.2	42.2	40.6	35.4	27.8	18.4	30.2	26.6	14.6
300micron	14.4	10.8	17	15.8	14.4	13.2	9	5.6	10.4	11.6	5.4
150micron	2.4	1	2.4	3.6	2	2.8	1.2	0.6	1.6	3.2	1.8
<b>ZONE</b>	<b>II</b>	<b>I</b>	<b>I</b>								
<b>F. M.</b>	<b>2.70</b>	<b>2.83</b>	<b>2.62</b>	<b>2.73</b>	<b>2.76</b>	<b>2.90</b>	<b>3.10</b>	<b>3.45</b>	<b>2.92</b>	<b>3.12</b>	<b>3.46</b>

\*BZ1:Black(Aji) Sand Zone-I and RZ2:Red(Bhogavo) Sand Zone-II

Table 2: Compressive Strength ( $N/mm^2$ )

SAND PROPORTION	W/C – 0.55		W/C – 0.50		W/C – 0.45	
	7 days	28 days	7 days	28 days	7 days	28 days
0% BZ1 + 100% RZ2	14.96	30.22	19.56	33.33	23.04	38.22
10% BZ1 + 90% RZ2	17.93	30.81	21.33	34.59	26.44	39.70
20% BZ1 + 80% RZ2	21.26	38.96	24.59	42.22	33.85	46.37
30% BZ1 + 70% RZ2	20.44	33.63	22.52	40.30	33.56	46.37
40% BZ1 + 60% RZ2	19.56	33.11	20.81	38.07	31.48	36.78
50% BZ1 + 50% RZ2	15.33	23.78	21.33	33.93	28.22	39.96
60% BZ1 + 40% RZ2	18.74	28.81	21.78	37.26	22.30	38.52

70% BZ1 + 30% RZ2	20.67	31.19	23.33	38.67	25.78	42.00
80% BZ1 + 20% RZ2	23.70	40.59	24.67	42.96	34.30	44.22
90% BZ1 + 10% RZ2	20.00	33.04	22.22	37.33	24.15	41.63
100% BZ1 + 0% RZ2	18.74	26.44	20.81	30.96	23.63	38.67



### CONCLUSION:

- The parametric study results shows that the change in proportion of black and red sand, the improvement in the strength of concrete was observed.
- The comparative study of compressive strength clearly states that the 20% addition of red sand to the black sand increases the compressive strength by 35.54% to that of strength obtain by adding 100% black sand.
- The comparative study of compressivestrength clearly states that the 20% addition of black sand to the red sand increases the compressivestrength by 25.64 % to that of strength obtain by adding 100% red sand.

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