WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Comparative analysis of sand from different sources on the basis of various properties

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ABSTRACT :

This Study present a comparative analysis of sand samples which collect from different river. The properties such as grain size disrtribution color variation. Through detailed examination and testing the differences in these properties among the sand samples are investigated. The results offer valuable insight into the diverse characteristics of sand sourced from different location, Providing insight in their geological orgins and potential application.

Keywords: Comparative analysis, Concrete Cubes, Sand

INTRODUTION :

Comparative analysis of sand from different sources based on various properties, it is crucial to highlight the significance of understanding the distinct characteristics of sand samples from different location. By examining properties such as grain size distribution, Color variation, mineral composition, this study aims to provide insight into the geological origins and potential application of sands sourced from different regions. This comparative analysis offers a comprehensive view of the unique properties of each sample contributing to deeper understanding of their individual qualities. Sand is a naturally occurring granular material composed of finely ground rock and mineral particals. It is a popular manufacturing material used across a broad spectrum of construction glass and transportation industries. Sand is a mixture of small grains of rock and granular material which is mainly defined by size being finer than gravel and coarser than silt.

MATERIAL :

2.1 Cement and Aggregate

Pozzolana Portland cement, graded as 43 grade, was utilized consistently along the concrete grade M20. The fine aggregates employed were sourced from clean river sand, with a maximum size of 4.75mm, meeting the requirements of zone II classification according to IS383-1970, boasting a specific gravity of 2.6. Coarse aggregates utilized were derived from machine-crushed stone, characterized by angular shapes, passing through a 20mm IS sieve and retained on a 4.75mm IS sieve.

2.2 RMC Mixer

A Ready-Mix Concrete (RMC) mixer is a machine used in construction to efficiently mix pre-prepared concrete batches. It ensures uniform mixing of ingredients like cement, aggregates, water, and additives, delivering consistent quality and strength. RMC mixers come in various types, such as drum mixers and volumetric mixers, and are vital for large-scale construction projects.

2.3 Collection of sand from different river sources

- **Wainganga River -** 1. Junona Ghat
  2.Yenoda Ghat
  3.Valli Ghat

- **Saundad Ghat -** 1. Saundad Ghat
  2.Dighori Ghat
  3.Kumbhli Ghat
- **Crushed Sand**

EXPERIMENTAL DETAILS :

Concrete mix proportion

We have used M20 Grade of concrete throughout the project.

Cement	Fine Aggregate	Coarse Aggregate
1	1.5	3

Property of sand

Sr.No	Sand	Fineness modulus	Silt content (Volume method)
1.	Junona Ghat	2.44%	7.77%
2.	Yenoda Ghat	3.06%	8.05%
3.	Valli Ghat	2.79%	7.89%
4.	Dighori Ghat	2.06%	10.33%
5.	Saundad Ghat	2.17%	10.52%
6.	Kumbali Ghat	2.69%	8.64%

Table 1 – Property of sand

Preparation of cubes

Calculation of material

1. Size of cube= 150mm x 150mm x 150mm
2. Volume of cube= 0.003375 m^3.
3. Wet volume= 0.005197 m^3.
4. Making concrete of M20 grade (1:1.5:3)
5. Cement for nine cube - 1.36 x 9= 12.24 kg. (1.36 kg for one cube)
6. Sand for nine cube - 2.27 x 9= 20.43 kg. (2.27 kg for one cube)
7. Aggregate for nine cube - 4.53 x 9= 40.77 kg. (4.53 kg for one cube)
8. Water for nine cube – 700 x 9= 6.3 liter. (700 ml for one cube)

Procedure of test

1. Clean the moulds properly and apply oil inside the cube frame.
2. Fill the concrete in the molds in layers approximately 50mm thick.
3. Compact each layer with not less than 25 strokes per layer using a tamping rod.
4. Level the top surface and smoothen it with a trowel.
5. The concrete cubes are removed from moulds after 24 hr.
6. Put all the cubes in curing tank.
7. These cubes are tested by compression testing machine after 3,14,28 days.

Days	Strength Percent
3 Days	40%

14 Days	90%
28 Days	99%

Testing of cubes

1. Removing the cubes from water after specified curing time.
2. Wipe out excess water from the surface.
3. Place the cube in the compression testing machine such a manner that the load shall be applied
4. Aling the cube centrally on the base plate of the machine.
5. Apply the load gradually.
6. Record the maximum load.

Result :

4.1 Slump cone test result

Sr.No	Sources of Sand	Slump Result (MM)
1.	Junona ghat	74
2.	Yenoda ghat	62
3.	Valli ghat	71
4.	Dighori ghat	80
5.	Saundad ghat	65
6.	Kumbhli ghat	72
7.	Crushed Sand	77

Table 2- Slump Cone test result

4.2 Compressive test result of cube

Sand Sources	Test Days	Cube No	Load(KN)	Strength (N/mm^2)	Average Strength (N/mm^2)
Junona Ghat	3rd Day	A1	227	10.08	10.21
		A2	254	11.28	
		A3	211	9.28	
	14th Day	A4	410	18.22	23.93
		A5	615	27.33	
		A6	590	26.22	
	28th Day	A7	556	24.71	27.19
		A8	653	29.02	
		A9	627	27.86	

Table 3- Junona Ghat Result

Sand Sources	Test Days	Cube No	Load(KN)	Strength (N/mm^2)	Average Strength (N/mm^2)
Yenoda Ghat	3rd Day	B1	247	10.97	8.48
		B2	153	6.8	
		B3	173	7.68	
	14th Day	B4	400	17.77	21.01
		B5	470	20.88	
		B6	549	24.4	
	28th Day	B7	400	17.77	24.32
		B8	588	26.13	
		B9	654	29.06	

Table 4- Yenoda Ghat Result

Sand Sources	Test Days	Cube No	Load(KN)	Strength (N/mm^2)	Average Strength (N/mm^2)
Valli Ghat	3rd Day	C1	168	7.46	8.3
		C2	177	7.86	
		C3	216	9.6	
	14th Day	C4	536	23.82	22.84
		C5	606	26.93	
		C6	400	17.77	
	28th Day	C7	540	24	22.51
		C8	380	16.88	
		C9	600	26.66	

Table 5- Valli Ghat Result

Sand Sources	Test Days	Cube No	Load(KN)	Strength (N/mm^2)	Average Strength (N/mm^2)
Dighori Ghat	3rd Day	D1	176	7.82	7.61
		D2	120	5.33	
		D3	188	8.35	
	14th Day	D4	404	17.95	22.02
		D5	610	27.11	
		D6	473	21.02	
	28th Day	D7	500	22.22	24.47
		D8	530	23.55	
		D9	622	27.66	

Table 6- Dighori Ghat Result

Sand Sources	Test Days	Cube No	Load(KN)	Strength (N/mm^2)	Average Strength (N/mm^2)
Saundad Ghat	3rd Day	E1	200	8.88	9.68
		E2	242	10.75	
		E3	212	9.42	
	14th Day	E4	420	18.66	18.09
		E5	384	17.06	
		E6	404	17.95	
	28th Day	E7	426	18.93	24.65
		E8	572	25.42	
		E9	666	29.6	

Table 7- Saundad Ghat Result

Sand Sources	Test Days	Cube No	Load(KN)	Strength (N/mm^2)	Average Strength (N/mm^2)
Kumbhli Ghat	3rd Day	F1	165	7.33	8.14
		F2	171	7.6	
		F3	215	9.5	
	14th Day	F4	400	17.77	16.04
		F5	330	14.66	
		F6	358	15.91	
	28th Day	F7	450	20	23.7
		F8	560	24.88	
		F9	590	26.22	

Table 8- Kumbhli Ghat Result

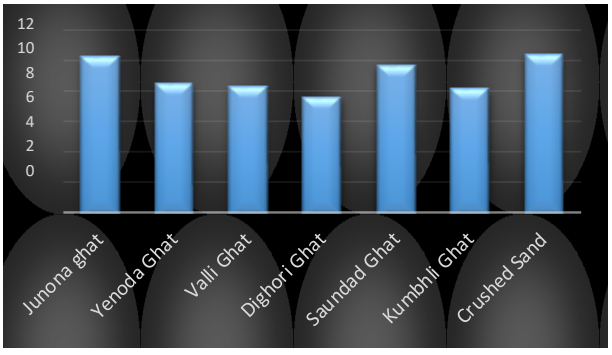
Sand Sources	Test Days	Cube No	Load(KN)	Strength (N/mm^2)	Average Strength (N/mm^2)
Crushed sand	3rd Day	G1	213	9.46	10.43
		G2	236	10.48	
		G3	256	11.37	
	14th Day	G4	400	17.77	16.14
		G5	330	14.66	
		G6	360	16	
	28th Day	G7	446	19.82	22.97
		G8	550	24.44	
		G9	555	24.66	

Table 9- Crushed Sand Result

4.3 Result of 3rd days testing

- Wainganga River
- 1. Junona Ghat- 10.21
- 2. Yenoda Ghat- 8.48
- 3. Valli Ghat- 8.3

- Chulband River
- 1. Dighori Ghat- 7.61
- 2. Saundad Ghat- 9.68



- 3. Kumbhli Ghat- 8.14

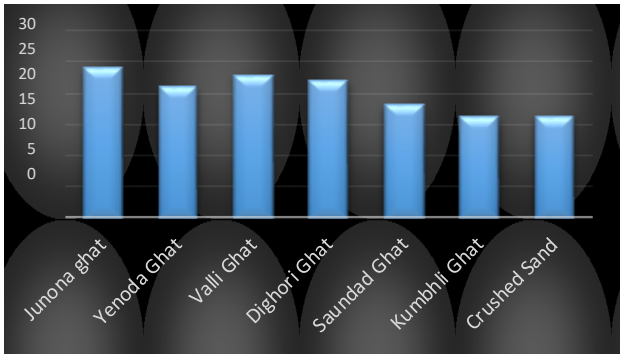
- Crushed Sand- 10.43

4.4 Result of 14th days testing

- Wainganga River
- 1. Junona Ghat- 23.92
- 2. Yenoda Ghat- 21.01
- 3. Valli Ghat- 22.84

- Chulband River
- 1. Dighori Ghat- 22.02
- 2. Saundad Ghat- 18.09
- 3. Kumbhli Ghat- 16.04

- Crushed Sand- 16.14

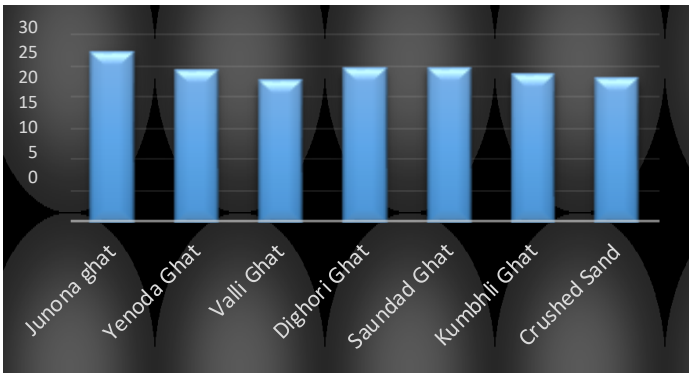


4.5 Result of 28th days testing

- Wainganga River
- 1. Junona Ghat- 27.19
- 2. Yenoda Ghat- 24.32
- 3. Valli Ghat- 22.51

- Chulband River
- 1. Dighori Ghat- 24.47
- 2. Saundad Ghat- 24.65
- 3. Kumbhli Ghat- 23.7

- Crushed Sand- 22.97



CONCLUSION :

Based on the comparative analysis of sand from different sources, the conclusion would depend on the specific properties you have to examined. If you found that one source has a higher mineral content that could be benificial for certain applications. The key differences in properties between the sand sources and make a recommendation based on which source aligns best criteria important for your intended use.

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