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Partial Replacement of Cement By Kota Stone Powder

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ABSTRACT: Kota Stone is a fine-grained assortment of limestone, quarried at Kota region, Rajasthan, India. Many mines are situated in or close to the town of Ramganj Mandi and in the Kota region. The greenish-blue and earthy colored shades of this stone add to its ubiquity. Different tones are dark, pink, dim, and beige. During cutting and cleaning measure, a ton of material remaining parts unused, and this waste might be called as Kota stone cutting and cleaning waste. During the way toward cutting, in that unique stone waste mass is lost by 25% as residue. Appropriately, the measure of mining and handling waste has expanded. (3) Recent advances in the substantial innovation are supporting limiting the utilization of traditional materials by subbing side-effects of different ventures and energy sources. A lot of stone squanders i.e., residue and slurry structure both are being started during regular stone preparing and causing genuine consequences for the climate. The removal issue of stone waste can be settled successfully by utilizing waste in development businesses. In present work, Kota stone slurry powder, as a halfway substitution to solidify was utilized to contemplate their effect on different properties of the substantial blends. Results showed Kota stone slurry powder upgraded the mechanical strength. Kota stone slurry powder observed to be the best material. In the current examination, concrete has been to some extent supplanted with Kota Stone powder in two diverse rate blends of 7.5% and 12.5% by weight of concrete substance in concrete for M20 and M25 grade of Concrete. The test examination was done according to suggested strategies by applicable codes.

KEYWORDS: Kota Stone Powder , Marble , Strength , Cement

I. INTRODUCTION

Kota Stone is a fine-grained assortment of limestone, quarried at Kota region, Rajasthan, India. Many mines are situated in or close to the town of Ramganj Mandi and in the Kota region. The greenish-blue and earthy colored shades of this stone add to its prominence. Different tones are dark, pink, dim, and beige. The current unloading rehearses have been making various annoyances and issues, including ecological and human wellbeing. Logical removal frameworks yet with more accentuation on designing usage must be grown all the while and as quick as could be expected. Development businesses can be the primary client of marble slurry whether in mass or minor amounts. The use of marble slurry in the assembling of blocks, incorporates full supplanting of customary fine totals with marble slurry content. Utilization of stone waste in different designing applications can take care of the issue of discarding stone waste and different purposes. Stone waste can be utilized in cement to work on its solidarity and other sturdiness factors. Stone waste can be utilized as an incomplete substitution of concrete or substitution of fine total and as a strengthening expansion to accomplish various properties of cement. The utilization of the substitution materials offer expense decrease, energy reserve funds, seemingly predominant items, and less risks in the climate (3) During the way toward cutting, in that unique stone waste mass is lost by 25% as residue (3) Recycling of stone cutting waste has a constructive outcome in keeping away from the natural corruption because of the effect of these materials. Earth, reusing of the stone cut-chime waste will lessen its effect on the environment, save the normal assets, and decrease CO₂ emanations (7). Nature has gifted enormous stores of stones like marble, rock and wide assortment of limestone. India positions third on the planet in stone creation and thusly in the creation of stone slurry. Kota stone is a fine-grained assortment of limestone.

Thus, this waste can be utilized as a substitution of concrete. Accordingly, this will diminish the expense of development as less concrete would be used. Moreover, Kota stone slurry, which is a waste gets diminished and utilized. To the best of information on the creator, this is the first run through where stone cutting waste is utilized for

hefty metal expulsion. Utilizing of this minimal expense, recyclable material will diminish the inconveniences of utilizing huge amounts of costly compound added substances that producing enormous volumes of poisonous muck.

II. LITERATURE REVIEW

Aman Jain et al [1] Kota stone wastes are accessible from stone pulverizing units in bountiful sum. The waste got is called stone chips. Sifter investigation according to IS Code strategy is performed on this waste and dominating size of waste particles is acquired. This waste so acquired is tried by supplanting 5%, 10%, 15% of concrete in the substantial. The research center test brings about compressive strength and Split Tensile strength, appears to show that it increments and upgrades the blend strength over the customary blend. Additionally, higher usefulness is acquired for more basalt total substance blend which diminishes the expense of work.

Rahul Jain et al [2] explored on Kota stone slurry (KSS) and expressed that it very well may be utilized as a fractional substitution of the concrete in this investigation. The goal of the current examination is to decide strength and toughness boundaries of the substantial containing Kota stone slurry. The trial program comprises of planning concrete blends in with two water cover proportions: 0.40 and 0.50 with differing Kota stone slurry rate as 0, 5, 10, 15, 20 and 25% to some degree supplanted with concrete. The Compressive and flexural strength test, pull-off test was performed to assess strength and water penetrability test, carbonation test and scraped area test were performed to check the sturdiness of cement blends. The outcomes demonstrate that with the increment in Kota stone slurry content, the compressive and flexural strength diminished. The KSS cement can be utilized in development of unbending asphalts in minimal expense streets, as it has performed better in scraped spot.

Jitesh Mehta et al [3] Kota stone slime can be utilized as an incomplete substitution of 'Concrete'/Fine/Coarse Aggregates'. This aides in decreasing the expense, saving the energy and has less risks on the climate. The Proper evaluating brings about higher pressing, further developed strength (Compressive Strength, Tensile Strength, Flexural Strength), more prominent solidness and scraped area obstruction. The stone waste can be supplanted as half by weight of materials which is utilized for blocks and substitution of OPC by stone waste @30% gives most extreme strength.

Sayed Imran Ali et al [4] M40 grade cemented is tried because of more extensive scope of uses. GGBFS can be utilized alongside OPC and PPC. Unrivalled sturdiness of constructions reaching out from 50-100 years. The Silka-Plastiment @ 0.7% by weight of concrete can be utilized which is plan according to IS 10262: 2009. The droop esteem increments with expansion in GGBFS and diminishes with expansion in content of KSPS. The substitution of 40% of concrete by GGBFS brings about just 1%-3% decrease in CS following 56 days which is certifiably not a critical change. For previously mentioned blend, substitution of 20% of FA by KSPS likewise gives comparable outcomes. Likewise, for FS comparable outcomes are noticed.

In an investigation directed by Harshwardhan S.C. et al [5], the stone slurry was utilized in M-25 grade concrete as a replacement of OPC in the extent of 0, 10, 20, 30, 40, and half; the substitution was finished by weight of concrete. The substantial blends were tried for functionality and strength on regular cement. The outcome showed expanded compressive strength up to 30% concrete substitution.

In an examination directed by Ankit Nilesh Chandra Patel et al [6], The molecule size of the KSS utilized was less than 90 μm . Blend extent was of 1:3 by volume. Waterway sand - zone-III according to details IS 383: 1970. ACC Brand, Portland Pozzolana Cement (PPC) was utilized. The concrete was subbed in extents of 0 to 30% with a timespan. 1:3 mortar was utilized for test planning with 0.85 w/c proportion consistent for all blends. The test outcomes show that elasticity, compressive strength, flexural strength expanded up to 10% substitution of concrete by KSS, and afterward it diminished. Thus, it is sufficient to supplant concrete up to 10% with no misfortune in strength.



III. METHODOLOGY

Table 1: Compressive Strength test result of M20 concrete mix

Sr. No.	Amount of Kota Stone dust used	Compressive Strength at 28 days (N/mm ²)
1	0%	27.93
2	5%	30.72
3	10%	29.35
4	15%	22.27

Table 2: Compressive Strength test result of M25 concrete mix

Sr. No.	Amount of Kota Stone dust used	Compressive Strength at 28 days (N/mm ²)
1	0%	22.89
2	5%	25.64
3	10%	24.26
4	15%	17.28

Table 3: Split Strength test result of M20 concrete mix

Sr. No.	Amount of Kota Stone dust used	Compressive Strength at 28 days (N/mm ²)
1	0%	3.13
2	5%	3.36
3	10%	3.24
4	15%	2.19

Table 4: Split Strength test result of M25 concrete mix

Sr. No.	Amount of Kota Stone dust used	Compressive Strength at 28 days (N/mm ²)
1	0%	3.5
2	5%	3.83
3	10%	3.24
4	15%	2.19

Table 5: Details according to % replacement

	0% replacement	30% replacement
W/C	0.040	0.40
Concrete	1.00	0.70
FA	1.01	1.01
CA	2.50	2.50
KS Waste	-	0.30
C-S 28 days N-sq mm	16.22	29.78
Total cost/m ³ (march2013)	4135.12	3244.18

Table 6: Details according to % replacement of KSS

	0% replacement	10% replacement
7 days Compressive strength MPa	3.84	4.17
28 days Compressive strength MPa	8.2	8.58
Flexure strength MPa	2.32	4.12
Tensile strength MPa	0.541	2.50

IV. CONCLUSION

The business' removal of the marble/rock/kotastone powder material, comprising of exceptionally fine particles, today establishes to be one of the major natural issues all throughout the planet. Marble/Granite blocks are cut into more modest squares to give them the ideal smooth shape. During the cutting interaction about 25% of the first stone mass is lost. Utilization of stone waste in different designing applications can tackle the issue of its removal. Stone waste can be utilized in cement to work on its solidarity and other toughness boundaries. This can be utilized as a halfway substitution of concrete, sand and coarse total keeping up with the exceptional properties of cement. Utilization of such materials offer expense decrease, energy investment funds and better items with less risks than the climate. Thinking about the strength rules, the substitution of concrete by Kota Stone powder by 7.50 % is practical to acquire a most extreme strength at 28 days. The higher substitution of Kota Stone Powder doesn't show enormous decrease in strength. By adding Kota Stone powder more than 7.50 %, the compressive strength, Flexural Strength and Split Tensile strength diminishes. Droop worth of Concrete with Kota Stone Powder is higher than Conventional cement.

Considering two fundamental significant properties, for example, Characteristic compressive Strength and Flexural Strength we can lean toward 12.50% according to financial perspective, the substitution of concrete by Kota Stone powder. From concentrating every one of these examination paper, plainly sure and good outcomes are gotten if further exploration work and study is completed in this field. What's more, by utilizing locally accessible squanders like glass squander, marble dust powder, ceramic waste, quarry dust, GGBS, Fly debris, and so on as halfway replacement at spot of substantial fixings, it might demonstrate more efficient than customary cement and question of damping of such waste delivered by various enterprises is additionally get tackled. Extreme objective is to deliver efficient and eco-accommodating cement with every single wanted property and strength which one acquires by standard substantial fixings.

REFERENCES

1. Aman Jain, Rohan Majumder, (2016), Strength, "Permeability and Carbonation properties of Concrete containing Kota Stone Slurry", SSRG International Journal of Civil Engineering (SSRG-IJCE), Volume 3 Issue 6.
2. Er. Rahul Jain, Er. Manish Dubey, (2018), "Analysis of Performance of Kota Stone By replacing certain amount of Cement in Concrete Blocks of M20 & M25 Grades", International Research Journal of Engineering and Technology (IRJET), Volume: 05 Issue: 05.



3. Jitesh Mehta, Dr. Chetanaben M. Vyas, Dr. Jayesh Kumar Pitroda, (2016), "A Critical Literature review on Effective Utilization of Kota Stone Sludge as Replacement of Marble Slurry Wastes in Brick", International Journal of Trend in Research and Development, Volume 3(1), ISSN: 2394-9333.
4. Sayed Imran Ali, Ranjan Kumar, Mukesh Kumar Yadav, (2018), "An Experimental Investigation on Concrete Containing Ground Granulated Blast Furnace Slag and Kota Stone Powder Slurry", International Research Journal of Engineering and Technology (IRJET), Volume: 05 Issue: 04, e-ISSN: 2395-0056, p-ISSN: 2395-0072.
5. Harshwardhan S.C., Pawan Kalla, Ravindra Nagar, Pradeep Kumar Gautam, "Partial Replacement of Cement by Kota Stone Slurry in Mortar-Recent Trends in Civil Engineering & Technology", ISSN: 2249-8753 (Online), ISSN: 2321-6476 (Print), Volume 7, Issue 3-STM Journals 2017-8-13pg.
6. Ankit Nilesh Chandra Patel, Prof. Jayesh Kumar Pitroda, (2013), "Stone Waste in India for Concrete with Value Creation Opportunities", International Journal of Latest Trends in Engineering and Technology (IJLTET)-ISSN: 2278-621X, Vol. 2 Issue 2.
7. Kamel Al-Zboon, Jehad Al-Zoubi. (2015), "Recycling of Stone Cutting Slurry in Concrete Mixes-Journal of Material Cycles and Waste Management", J Mater Cycles Waste Manag 17, 3.



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