PARTIAL REPLACEMENT OF FINE AGGREGATE BY MARBLE SLURRY CEMENT WORKS

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ABSTRACT
Leaving the waste materials to the environment directly can cause environmental problem. The 70% Part of Marble is wastage in marble industry and responsible for many Sevier environmental problems. The marble waste is non degradable material. So it is a Sevier environmental hazard. By flowing of marble slurry with rain water contaminate Water and Soil both. Due to the presence of fine particles in marble slurry air is also polluted. Fine particles of marble slurry deposit over leaves of vegetation, plants and trees creating aesthetic problems. Due to deposition of marble dust over leaf the vegetation, plants as well as trees die, Hence loss of flora and fauna? Hundred percent solution of problem is the utilization in lot. Fineness modulus was found to be 0.91 and it is cohesion les material. According to this Marble slurry can be utilized in finishing work as White wash with lime. This is 50% cheaper and also good solar heat repellent causing natural building cooling

Keywords *– cement, marble slurry, aggregate, workability, compressive strength.*

I. INTRODUCTION

Rajasthan has around 4000 marble mines and about 1100 marble gang saws (processing units). At the same time it leads to growth of many processing units in respective areas. These two activities in Rajasthan have been extended in 20-25 years and have played important role in the economy of the state providing direct and indirect employment to majority of people and therefore also raising their living standard. Marble Slurry is a suspension of marble fines in water, generated during processing and polishing, etc. It is shaping to major threat of the Environment in the state by mining and processing activities. Nearly one thousand Gang saws and thousands of cutters are producing 15-20 lack tons of marble slurry waste which is indestructible waste and harm to general Public. Some of effects of the marble slurry may be listed as below: -

1. The waste is inconsumable.
2. The sites which can be used as dumping ground are limited and give repulsive dirty look.
3. Polluting of top fertile soil cover.
4. Polluting of the rivers
5. Polluting of air

For this purpose the most useful steps can be:

(A) Utilization (B) Disposal.

Utilization and scientific dispensation of marble slurry on a properly selected dumping sight may be better solution of the problem. But now a day's production increasing day by day the Utilization is the only solution of the problem.

II. LITERATURE REVIEW

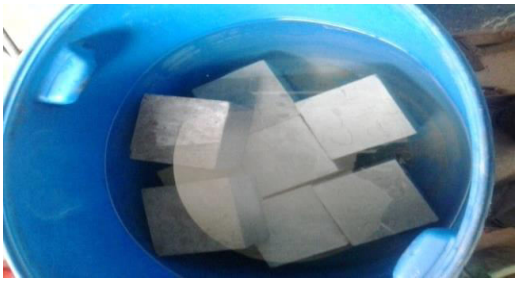
Acchar W. et.al, A.M. Segadaes and F.A. Vieira, 2006. Based on this experimental study, the following conclusions can be drawn:

- Both the compressive and splitting tensile strength of the mortars containing MS and GP waste as RS alternatives are enhanced compared to cement mortar samples irrespective of the curing period.
- The use of up to 15 % GP waste as RS alternative increases the mortar's compressive and splitting tensile strength. The optimum % of GP waste is 15 %.
- **Acchar W. et.al, D. Hotza, and F.A. Vieira 2006** The results obtained in this work show that reject content up to 50 wt.% can be incorporated into clay materials, with-out degrading their mechanical properties.

- **Amit Viswakarma and Rakesh Singh Rajput (2013) J. Environ.** The maximum unconfined compressive strength of the clay is 215kN/m^2 at 15% of marble powder. The Marble Powder is

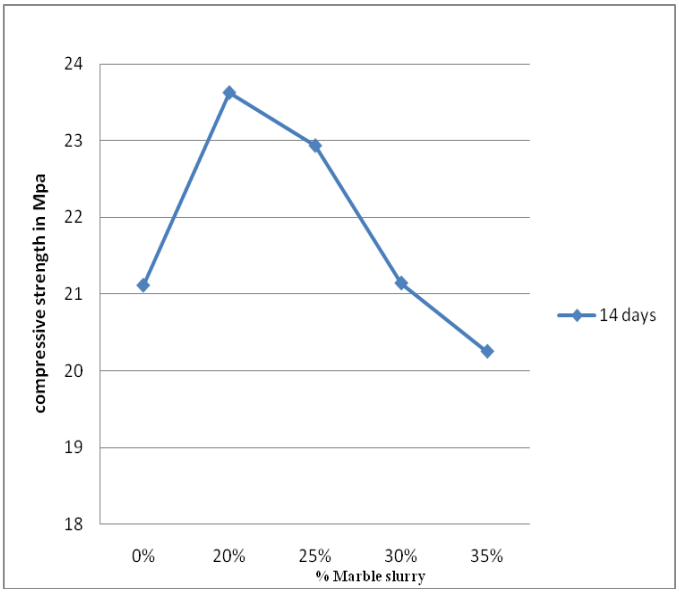
added about 15%.to the soil as strength point of view.

III. FIGURES AND TABLES



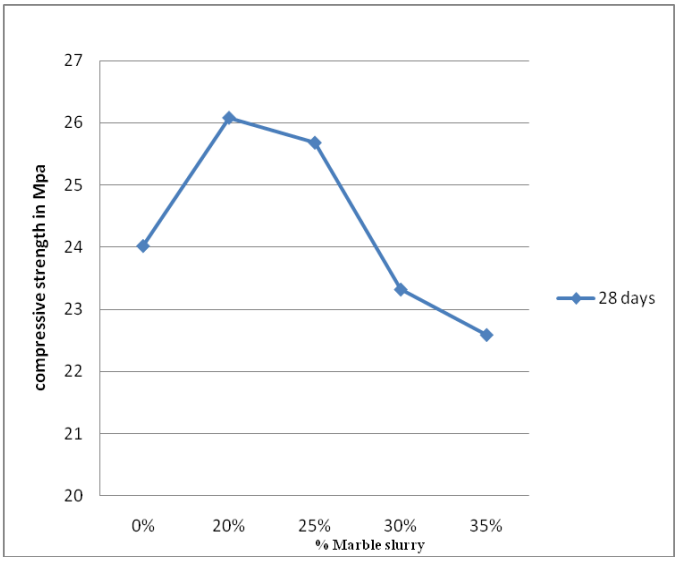
Compressive strength at 14 days:

%	Load in KN (Sample 1)	Load in KN (Sample 2)	Average Load KN	Compressive strength in N/mm^2
0%	487	463	475	21.11
20%	527.22	535.68	531.45	23.62
25%	511	521	516	22.93
30%	498.35	453	475.68	21.14
35%	466.2	445.3	455.75	20.25



Compressive strength at 28 days:

%	Load in KN (Sample 1)	Load in KN (Sample 2)	Average Load KN	Compressive strength in N/mm^2
0%	550.10	530.70	540.4	24.02
20%	590	583.60	586.80	26.08
25%	573.80	582	577.9	25.68
30%	532.10	517.25	524.68	23.32
35%	520	496.50	508.25	22.59



IV. CALCULATIONS

Size of Cube-150x150x150mm

Sectional area of Cube 150x150=22500mm^2

Compressive Stress =Load/Sectional area.

P= P/A mpa, N/mm^2

I,e. maximum stress for 14 days curing:

P=531.45x1000/22500 mpa., 23.62mpa

P=586.80x1000/22500 mpa., 26.08mpa

V. RESULTS AND DISCUSSION

Compressive strength of M25 grade concrete without marble slurry and with marble slurry with different percentage 20%, 25%, 30% and 35% are shown in table and graph above. At 25% replacement of sand with marble slurry compressive strength of concrete increases and at 30% replacement it almost remain same as without adding marble slurry. These are genuine results which show us that we can replace natural sand with marble slurry i.e. we can utilize the marble slurry and can resolve the problem of disposal of marble slurry. Therefore it will also ecofriendly to environment that there will be less harm to leaves of trees, fertility to land and reduction in environment pollution. By using marble slurry as construction material we can conserve natural recourses like sand and it will also economical to use.

VI. CONCLUSION

Due to marble slurry, it proved to be very effective in assuring very good cohesiveness of mortar and concrete. From the above study, it is concluded that the marble slurry can be used as a replacement material for sand; and 25% replacement of marble slurry gives an excellent result in strength aspect and quality aspect and it is better than the control concrete. The results showed that the substitution of 25% of the sand content by marble stone dust induced higher compressive strength and improvement of properties related to durability. Test results show that this industrial waste is capable of improving hardened concrete performance up to 30%, enhancing fresh concrete behavior and can be used in plain concrete.

REFERENCES

[1] Acchar W. et.al, A.M. Segadaes and F.A. Vieira, 2006. “Materials Science and Engineering Properties and microstructure development” Vol-A pp-435-436, and 606-610 “Using ornamental stone cutting rejects as raw materials for red clay ceramic products.”

[2] Acchar W. et.al, D. Hotza, and F.A. Vieira 2006 Materials Science and Engineering, A419: 306-309. “Effect of marble and granite sludge in clay materials”.

[3] ASTM D 3910 (1996), Yearly ASTM Book of Standards Construction, for Road and Paving Materials. Section 4, Vol.04.03, “Construction of Slurry Seal Design, and Testing.”

[4] Amit Viswakarma and Rakesh Singh Rajput (2013) J. Environ. Res. Develop. Journal of Environmental Research and Development Vol. 7 No. 4A, April-June 2013 1479 “Utilization Of Marble Slurry To Enhance Soil Properties And Protect Environment.”

[5] A.K. Sinha, (2000) Scenario in Rajasthan. Proceedings of International Stone Industry Exhibition, organized by RIICO “Marble Industry and Environment Issues.”