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Use of Marble Slurry Waste in Building Works to Protect Environment.

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Abstract - *Marble industry has grown significantly in India last decade with privatization trend in early 1985.Accordingly, the amount of mining and waste material has increased. The stone waste is more polluting waste due to its highly alkaline nature, and its manufacturing and processing techniques ,which has imposed the environment and health threats to the surroundings The test results revealed that use of marble can be made in physical and mechanical properties that qualify them in the building sector. In this way, the environment can be protected from the harmful effects of dumping marble slurry waste into open land. In this study, we have blended*

Marble slurry into black cotton soil in different proportions and have done relevant tests such as liquid limit test, plastic limit test, specific gravity test and proctor test.

Key Words: **Marble dust, Black cotton soil, Liquid limit test, plastic limit test and specific gravity test.**

1. INTRODUCTION

The continuing increase in world population results in a higher demand for new construction such as housing, public buildings and roads, thus the need for construction materials increases. Materials obtained by conventional methods are not sufficient to satisfy this demand. To ensure the sustainability of geotechnical and building construction, it is essential to utilize production waste as well as to create new sources of materials. Every year a large part of recyclable materials is disposed of in landfills or arbitrarily discharged to the environment. Therefore, researchers are interested in finding ways of eliminating the negative interested in finding ways of eliminating the negative impacts of waste and obtaining economic benefits from the recycled material has been a subject of research in recent years. In addition to lime, cement and bitumen, industrial waste materials such as fly ash, silica fume and blast furnace stag are being used as an additives in building materials from two decades.

Natural stone waste such as waste marble in different materials in building. The use of industrial waste as additives in the stabilization of soil granite consisting of particles smaller than 100 microns can now be used as soil stabilizers, concrete aggregates and fill materials for road building and the construction sector is the largest and most important sector in which natural stone waste can be used important sector in which natural stone waste can be used obtained from natural stone plants in soil stabilization and the impacts of different types of waste on soil will help determine the most economic and suitable waste to be used determine the most economic and suitable waste to be used. India is one of the richest countries in agricultural resources. Agricultural wastes are the byproducts of various agricultural activities such as crop production, crop harvest, saw milling, agro-industrial processing and others. In India sugar industry alone produces about 90 MT of baggage per year and being used in manufacturing of insulation boards, wall panels, printing paper and corrugating medium. There is a growing concern for agricultural wastes, which are mostly being burnt thereby contributing considerably to global warming. Use of organic wastes such as peanut husk, mahau and linseed residues, coconut coir dust, rubber seedpod, spent cashew nut shell etc., were explored and used for different applications. Inorganic solid wastes generation, recycling and utilization growing concern for agricultural wastes, which are mostly being burnt thereby contributing considerably to global warming. Use of organic wastes such as peanut husk, mahau and linseed residues, coconut coir dust, rubber seed pod, spent cashew nut shell etc., were explored and used for different applications.

The waste marble powder and soil mix properties can be used in the different part of the areas such as for the soil stabilization, compaction for base area and foundation filling. We do the research for the usage for the waste marble powder in many part of the construction field and other use for the dispose area. In our country the one famous marble name is Makrana Marble, which is available in the state of Rajasthan in Jaipur. With nearly 600–800 mines present the place offers a huge market potential for these companies. The present rate of marble production from Makrana is 1.20 lakh tones per year with annual revenue of 36 crore. Makrana is source of employment to at least 1 million people of about 100 surrounding villages. The global marble industry has expanded rapidly since 1990s and is expected to grow at more than 8% per annum in the future. Marble

industry is large and is continuously growing with most global producers focused on international trade. The global marble consumption in 2003 was 820 million sq. m. and is expected to reach a mammoth 4.4 billion sq. m. by 2025.4 presently, the international trade forms a major portion of the total marble trade. All leading marble producing countries focuses on exports market, the demand from which has outpaced the domestic demand. In 2003 nearly 54% of the total marble production was consumed in the international market while 46% was used for domestic consumption. The projection for marble market in 2025 predicts international trade to be around 60% while domestic consumption would further decrease to 40% of the total marble consumption. Rajasthan has enormous resources of dimensional stones that are widely spread all over the state. The estimated reserves are as follows: The global marble import in 2003 was pegged around USD 2.5 bn. The key segments of global marble imports were polished marble, unpolished slabs, uncut marble and blocks (cut marble).

2. METHODS AND METHODOLOGY

The black cotton soil and marble dust is mixed in different proportions i.e. 10%, 20%, 30%, 40% by weight of the dry soil. Tests were conducted on samples having different percentages of marble dust. The following tests were conducted on marble dust and soil mixes as per I S Code.

1. Grain size distribution.
2. Liquid limit.
3. Plastic limit.
4. Plasticity index.
5 Shrinkage limit.
6 Differential free swell.

- Soil
  The soil sample was collected from Alwar district of Rajasthan India involved in the study The soil can be classified as clay of plasticity (Gs = 2.56 with 95% fines).

- Marble dust.
  The marble dust was obtained from a marble cutting and polishing industry in Jaipur district Rajasthan India.

3. Test results

The different tests were conducted on various samples mix with soil and marble dust.

Altenburg limits:-

The engineering properties of marble BC soil is as follows:-

- soil classification CH
- Sp. Gravity g/cc 2.56
- Liquid limit % 57.64
- Plastic limit % 29.30
- Plasticity index (PI) % 28.34
- Shrinkage limit (SL) % 8.03
- Grain size distribution (%)
- Sand % 5
- Silt + clay % 95

Table no. 2: Test Results of BC Soil – Marble Dust (%)

S. No.	Particulars of tests	CM0	CM10	CM20	CM30	CM40
1.	Soil Classification	CH	CH	CI	CI	CL
2.	Liquid Limit (%LL)	57.64	51.43	42.11	39.20	33.88
3.	Plastic Limit (%PL)	29.30	28.00	23.41	21.58	17.25
4.	Plasticity Limit (%PI)	28.34	23.43	19.00	17.62	16.63
5.	Shrinkage Limit (%SL)	8.03	10.30	12.35	15.04	18.37

Note: Where CMO = BC Soil + 0% Marble Dust; CH = Inorganic Clay of high plasticity; CM10 = BC Soil + 10% Marble Dust; CI = Clay of medium plasticity; CM20 = BC Soil + 20% Marble Dust; CL = Clay of low plasticity; CM30 = BC Soil + 30% Marble Dust; CM40 = BC Soil + 40% Marble Dust.

4. RESULTS AND DISCUSSION

The test results done as per IS Code of practice 2720 .Test results shown in table of LL, PL, and SL shows that LL decreased from 57.64 % to 33.88% when marble dust increased from0% to 40%. Similarly the (PI) plasticity index BC soil decreases from 29.30% to 17.25% as the marble dust increased .Similarly (SL) shrinkage limit increased from 8.03 to 18.37.indicate the swelling behavior of the soil is considerably reduced.

5. CONCLUSIONS

The environment friendly, energy-efficient and cost effective alternative materials developed from solid wastes will show good market potential to cater to people's needs in rural and urban areas. To effectively utilize these wastes as a raw material, filler, binder and additive in developing alternative building materials, detailed physical-chemical, engineering, thermal, mineralogical and morphological properties of these wastes are to be evaluated and accurate data made available. In order to maximize the use of alternative building materials developed from different types of solid wastes and to increase the production capacity of lab scale processes, technology-enabling centers are needed to be set-up to facilitate entrepreneurs for effective commercialization.

The new and alternative building construction materials developed using agro-industrial wastes have ample scope for introducing new building components that will reduce to An extent the costs of building materials. The endeavor, therefore, needs to be to encourage entrepreneurs and construction agencies to develop new products and Processes using all these wastes as raw materials for setting up secondary industries and contributing to reduction of greenhouse gases and global warming.

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