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Use of Marble Slurry in Foundation

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ABSTRACT : With the trend towards privatization in early 1985, marble industry has grown significantly in India in the last decades. Consequently, the quantity of mining and waste material generated by it has increased very rapidly in past decade.

Over the last few decades the disposal of marble slurry dust from marble mines and cutting industries has been a major environmental concern. Stone wastes are more polluting due to their highly alkaline nature and their production and processing methods, which have put environmental and health hazards on the landscape. The test results revealed that marble slurry can be used in the building sector in physical and mechanical properties which qualify them for use. In this way it is possible to protect the environment from the harmful effects of dumping marble slurry waste into open land.

I. INTRODUCTION

The continuing increase in world population results in higher demand for new buildings such as housing, public buildings, and roads, thus increasing the need for building materials. Materials obtained using conventional methods are not enough to meet this requirement. To ensure the sustainability of geotechnical and building construction, the use of waste from manufacturing as well as the creation of new material sources is important. A large portion of recyclable materials are disposed of in landfills or illegally dumped into the atmosphere each year. In addition to lime, cement and bitumen, industrial waste products such as fly ash, silica fume, and blast furnace slag are used as an ingredient in two decades-old building materials. Natural stone waste such as scrap marble in different building materials.

We do the research for the usage for the waste marble powder in many parts of the construction field and other use for the dispose area. In our country the one famous marble name is Makana Marble, which is available in the state of Rajasthan. With almost 600–800 mines present, offers these companies enormous market opportunity. Makana's total marble production rate is 1.20lakh tones per annum with 36 crores of annual revenue. For at least 1 million people out of about 100 surrounding villages, Makana is a source of employment.

The global marble industry has expanded rapidly since the 1990s and is expected to grow in the future by more than 8 per cent per year. With most global producers focused on international trade, the marble industry is large and constantly growing. In 2003, the global consumption of marbles was 820 million sq. m. And the mammoth is expected to reach 4.4 billion square. m. By 2025.4, almost 54% of total marble production had been consumed on the international market in 2003, while 46% had been used for domestic consumption. Marble demand forecast for 2025 predicts that international trade will be around 60 per cent, while domestic consumption will further decline to 40% of total marble consumption. Rajasthan has large dimensional stone resources, which are widely spread throughout the state. Marble polished, unpolished slabs, uncut marble and blocks were the main segments of world marble imports.

In Foundation, we may use Marble Slurry by mixing with soil or directly into the foundation. Using the Waste Marble Slurry helps to increase foundation soil properties such as permeability, strength, capillary action, load distribution, termite action.

II. RESEARCH METHODOLOGY

The characteristics of the soil and marble dust can be defined as, the representative soil and marble dust samples were collected from Krishnagar and the surrounding areas where marble cutting units are located. The marble slurry and soil samples were prepared for various tests for their characterization.

We have divided this experimental programme into three tests using different materials listed below: -

Soil

Sand + Slurry

Slurry

The observations are noted and compared. Then best of three is revealed.

2.1 Soil

Aim: - To find out the amount of capillary action in soil.

Apparatus and Materials: - Glass box, Glass tube, Plastic Box, Scale(mm), Soil, Gravels, Membrane, Steel net etc.

Theory: - Soil is the natural medium that is composed of weathered mineral materials, organic material, air, and water. Soil is combination of solid and water and air. Soil are classification on the basis of particle size. Clay is type of soil and clay particle's size is less than 2 microns. Clay is used because it has less amount of Capillary action.

Procedure: -

- Firstly, collect soil sample and then sieve it.
- Take glass box of height 50 cm with a hole for drainage at the bottom.
- Put the stands in the glass box for support. And place the glass box on a table.
- Place the steel cage or membrane on the top of stands.
- Place the gravels in a layer of 10-12 cm.
- Fill the sand above the gravels up to height of 5 cm and level it.
- Fill the clayey soil up to height of 10 cm.
- Attach the tank with glass box through the pipe. Fill the water in the tank.
- Note down the reading of gauge after 1 day, 3 days, 5 days and 7 days.

2.2 Sand + Slurry

Aim: - To find out the amount of capillary action in the mix of soil and slurry in certain amount.

Apparatus and Materials: - Glass box, Glass tube, Plastic Box, Scale(mm), Soil, Gravels, Marble Slurry and Membrane, Steel net etc.

Procedure: -

- Firstly, collect soil and slurry sample and then sieve it.
- Take glass box of height 50 cm with a hole for drainage at the bottom.
- Put the stands in the glass box for support. And place the glass box on a table.
- Place the steel cage or membrane on the top of stands.
- Place the gravels in a layer of 10-12 cm.
- Fill the sand above the gravels up to height of 5 cm and level it.
- Fill the mixture of sand and slurry up to height of 10 cm.
- Attach the tank with glass box through the pipe. Fill the water in the tank.
- Note down the reading of gauge after 1 day, 3 days, 5 days and 7 days.

2.3 Slurry

Aim: - To find out the amount of capillary action in the Dry slurry.

Apparatus and Materials: - Glass box, Glass tube, Plastic Box, Scale(mm), Gravels, Marble Slurry and Membrane, Sand, Steel net etc.

Procedure: -

- Take glass box of height 50 cm with a hole for drainage at the bottom.

- Put the stands in the glass box for support. And place the glass box on a table.
- Place the steel cage or membrane on the top of stands.
- Place the gravels in a layer of 10-12 cm.
- Fill the sand above the gravels up to height of 5 cm and level it.
- Fill the dry slurry up to height of 10 cm.
- Attach the tank with glass box through the pipe. Fill the water in the tank.
- Note down the reading of gauge after 1 day, 3 days, 5 days and 7 days.

III. RESULTS AND DISCUSSION

Table 1 rise of water in soil

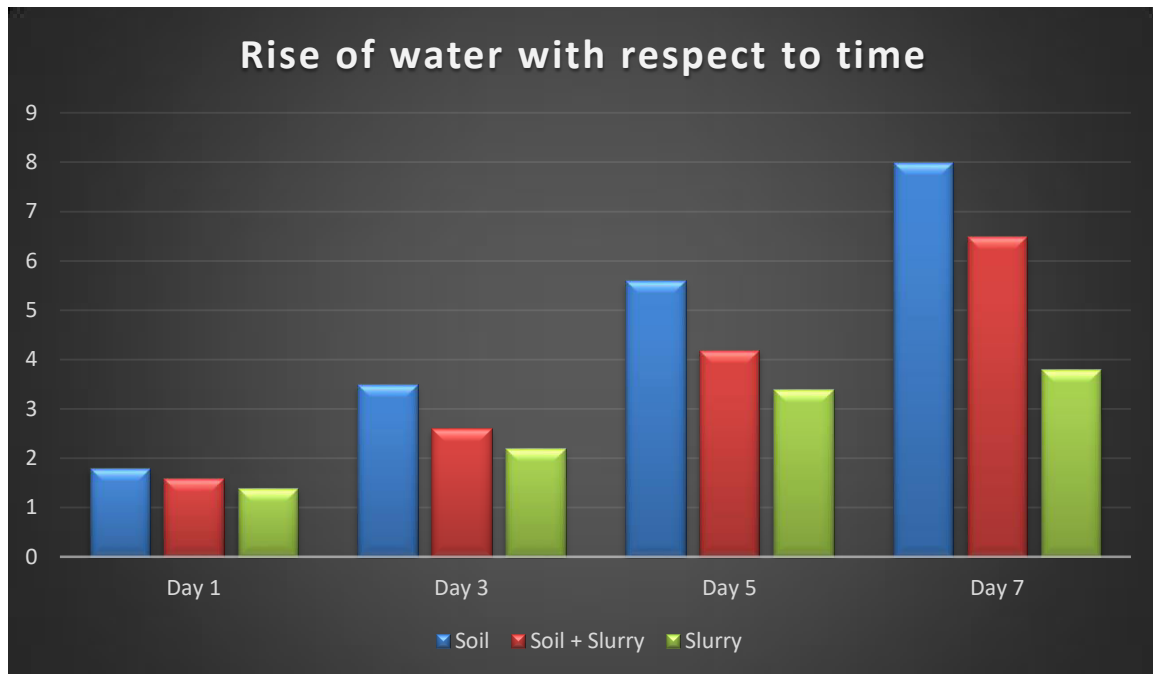
S. No.	No. of Days	Height of Water (cm)
1	1	1.8
2	3	3.5
3	5	5.6
4	7	8.0

Table 4.2 Rise of water in soil + slurry

S. No.	No. of Days	Height of Water (cm)
1	1	1.6
2	3	2.6
3	5	4.2
4	7	6.5

Table 3 Rise of water in slurry

S. No.	No. of Days	Height of Water (cm)
1	1	1.4
2	3	2.2
3	5	3.4
4	7	3.8



IV. CONCLUSION

As marble powder increases, permeability decreases due to marble powder being non-plastic and having colloidal fractions which form gel. Thus use of a layer of marble slurry around the concrete structure of the foundation is better than the conventional footing laid on available soil. This method is economical in the areas situated near the marble processing and finishing plants. Thus the waste marble slurry can be used as it is available in negligible rates.

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