

Parametric Analysis of Different Types of Plastering Materials

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Abstract - The natural sand which excavated from riverbed is used to produce conventional concrete. Depletion of natural sand cause the environmental problem and hence sand excavating is restricted by government which resulted in shortage and drastically increases in its cost. In order to fulfill the necessity of fine aggregates, an alternative material like crushed sand can be used in concrete. In this project, different types of plastering materials such as natural sand and artificial sand used and Study their effect using different parameters. Also, we have to study the effect of ready-mix plaster. Mortar mix is prepared with proportion of 1:2, 1:3 and 1:6 with water cement ratio of 0.5 and 0.55, respectively. All of the experiments are performed in normal room temperature. We have to also study the plastering materials based on different parameters. This paper puts forward the applications of manufactured sand as an attempt towards sustainable development. It will help to find viable solution to the declining availability of natural sand to make eco-balance.

Index Terms - Crushed Sand, Environmental impacts, Fine aggregate, Mortar.

I. INTRODUCTION

Conventional cement mortar is a composite material obtained by mixing cement, fine aggregate, and water. Sand is a major material used for preparation of mortar and concrete and plays a most important role in mix design. For masonry Construction River sand mortar was commonly used in India. River sand is common fine aggregate used in masonry construction work for production of mortar. The consumption of natural sand is very high, due to the extensive use of concrete or Mortar. Due to more and more extraction of river sand causes a serious environmental issue which becomes scare and costly. Fine aggregate in mortar constitute about 60-70% of total volume. Hence it is important to obtain good quality of fines which forms the main matrix of concrete or mortar.

Nowadays fine aggregate is expensive because of its demand in the construction industry. In construction industry natural sand is used as an important building material and world consumption of sand in concrete alone is around 1000 million tons per year. Due to this condition research began cheap and easily available alternative material to natural sand without compromising the durability and strength. Manufactured sand offers viable alternative to natural sand. Crushed sand is manufactured by crushing larger stones of quarry to particular size of sand. Its chemical & physical properties such as colour, size & shape, surface texture up particles depend upon types of stone & its source So in that study we use artificial sand in place of natural sand so that we can minimize the cost of the construction and providing same or more strength to the our construction. Crush sand is a kind of waste material that is generated from the stone crushing industry which is abundantly available to extent of 200 million tons per year.

Also, dry mix mortar (Ready mix plaster) is a new material technology. Ready mix plaster is easy to storage and handling purpose. Ready mix plaster manufacturing plant provides consistent quality mix, due to proper formulations of its major three constituents such as Ordinary Portland Cement, river sand, additives. Working of ready-mix plant is as per standard. In this project, we study different types of plastering materials based on parameters and find out which plaster is economical and durable.

II. METHODOLOGY

The following steps are followed to complete the work (study) were as follows:

1. Literature survey
2. Problem identification
3. Objectives finalization

4. Methodology:
- Find out the quantity of materials
 - Collection of material
 - Testing of material such as cement, natural sand, crushed sand to determine its physical properties.
 - Casting of cubes
 - Curing of cubes
 - Testing on cubes
 - Cost analysis
 - Result analysis
 - Report writing
 - Presentation

A. Objectives

- To compare between different types of plastering materials.
- To compare a cost of different types of plastering materials.
- To study the compressive strength properties of mortar after 3 and 7 days.

B. Testing of Material

1. Cement:

Cement is one of the binding materials in the construction work. In this project we used 53 grades Ordinary Portland Cement (OPC) From the IS: 8112 – 1989.

Table No. 1: Properties of Cement

Sr. No.	Description of test	Test results	Specifications as per IS:8112-1986
1	Initial setting time	35 min	Min. 30 minutes
2	Final setting time	510min.	Max.600 minutes
3	Consistency	7mm (from bottom)	5 -7 mm
4	Specific gravity	2.71	3.15

2. Fine aggregate:

The aggregate which is passes through the 4.75 mm sieve it is called as fine aggregate.

Natural sand: Locally available river sand is used as fine aggregate. The various properties tested as per IS 383-1970.

Table No. 2: Properties of Natural Sand

Sr. No	Description of item	Test result obtained	Specifications as per IS:383-1970
1	Specific gravity	2.29	2.5 – 3

2	Water absorption	2.3%	0.3 – 2.5 %
3	Fineness modulus	3.54	2 – 4

Crushed sand: Crushed sand is manufactured by crushing stones. Locally available crushed sand is used for experiments and the various properties tested as per IS 383-1970.

Table No. 3: Properties of Crushed Sand

Sr. No	Description of item	Test result obtained	Specifications as per IS:383-1970
1	Specific gravity	2.70	2.5 – 3
2	Water absorption	2.5%	0.3 – 2.5 %
3	Fineness modulus	2.88	2 – 4

3. Water

Water is used for mixing & curing was clean & free from injurious amounts of oil acid salt sugar & organic materials. Portable water is generally considered satisfactory for use in masonry mortar. The pH value shall not be less than 6. For further requirements regarding limits of deleterious materials permitted reference may be made to IS: 456-1978.

4. Ready mix plaster:

Ready mix plaster is a blend of Portland cement, fine graded sand, and water soluble, high quality polymer additives, in the right proportions. It is ready to use by simply mixing water at the site and can be easily applied on brick, block, and concrete surfaces. In this project we used Ultratech readiplast. The use of ready-mix plaster is done as per IS 2250-1981 and IS 4031-Part 6.

III. CASTING AND CURING

Casting is a manufacturing process in which a liquid, material is usually poured into a mold which contains a hollow cavity of the desired shape and then allowed to solidify.

IV. COMPRESSIVE STRENGTH

For determining the compressive strength, standard cubes of mortar (70mm x 70mm x 70mm) size were casted and tested using compression testing machine (CTM). Compressive strength of specimens was tested after 3 and 7 days for proportion 1:4 and w/c ratio 0.55. Result shows the compressive strength of natural sand plaster, crushed sand plaster and ready-mix plaster.

Following tables shows the compressive strength of mortar cubes.

Table No. 4: Result of Compressive Strength Test

Sr. No.	Type of Plaster	Compressive strength after 3 days, MPa	Compressive strength after 7 days, MPa
1.	Natural sand plaster	6.53	8.26
2.	Crushed sand plaster	15.74	16.73
3.	Ready mix plaster	11.71	14.38

Comparison of Compressive strength

From table no. 4 comparative graph of compressive strength is shown in Fig. 1 below.

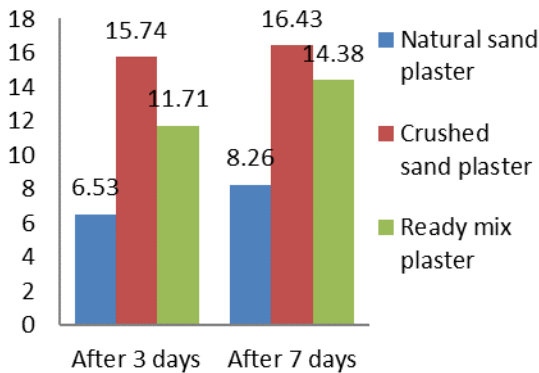


Fig. 1 Comparison of Compressive strength

Cost Analysis:

With the method of Cost Analysis as per [4], comparative graph of cost is shown in Fig. 2 below.

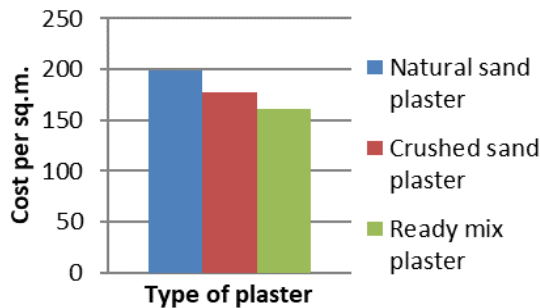


Fig. 2 Cost Comparison

V. CONCLUSION

1. From Fig. 1, the comparison of compressive strength of cubes after 3 days prove that compressive strength of crushed sand mortar is 58.52 % more than the natural sand mortar and 25.61 % more than the ready-mix plaster.

2. From Fig. 1, the comparison of compressive strength of cubes after 7 days prove that compressive strength of crushed sand mortar is 49.73 % more than the natural sand mortar and 12.48 % more than the ready-mix plaster.
3. From Fig. 2, it is observed that the cost of natural sand plaster is 19 % more than ready mix plaster whereas the cost of artificial sand plaster is 9.3 % more than ready mix plaster.
4. By referring all these results, we conclude that ready mix plaster is good because it is economical. Its strength is not excellent but good as well as time saving material.

V. SCOPE OF WORK

1. This work helps to choose economical plastering material and reduced cost of construction.
2. Makes the process of plastering much easier and quicker.
3. Improves the appearance by using different types of plastering materials.
4. Also helps to choose plastering material to improve the lifespan.

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