



PERFORMANCE EVALUATION OF CONVENTIONAL BRICKS WITH SLUDGE BRICKS

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Abstract:

The disposal of sewage waste is the major problem in urban cities as it causes many harmful effect to the environment. Sludge is the main product from sewage waste. Conventional brick is mostly prepared by using clay. Chemical composition of sludge is nearly similar to the clay. Hence sludge can be used as a replacement for a clay, soil in manufacturing of bricks.

Index Terms – Dry sludge, Fly ash, Waste material,

Compressive strength.

I. INTRODUCTION:

Brick is one of the most important construction elements. The history of brick manufacturing goes back 8000 years when the fabrication of the earliest sun dried clay bricks was discovered. Main ingredient of brick is soil but now a days soil is precious and not easily available due to large scale deforestation and erosion. As it becomes cost prohibitive to obtain soil for brick manufacturing is costly affair and problem arises in erosion control. Hence to reduce percentage of soil it is necessary to find out alternative option. Dry sewage sludge is a byproduct of sewage treatment plant and it is mostly used as manure in the agricultural fields. The use of sludge (obtained from the drying beds of 'Sewage Treatment Plant') as one of the ingredients in brick manufacturing, thus replacing soil partially has been in practice in the Construction Industries for quite some time. However the percentage of soil replacement by dry sludge depends on the sludge quality which is expected to have been fully biodegraded with no reservations for handling. The present study focuses on utilization of dry sludge from sludge drying bed of Sewage Treatment plant for use in manufacturing of bricks thus exploring possibility of replacing higher percentage of soil with dry sludge than the prevailing practice in the construction industry. The aspect of reduction in cost of the brick provides a strong logic for use of dry sludge for partial soil replacement in the manufacturing process of the bricks. The dry sludge to be used for the purpose is checked for its physical properties like bulk density, percentage water absorption and mechanical properties like compressive strength.

Now a day, disposal of sewage has become a necessity for societies. The construction of treatment plants has caused problems with huge content of dry sludge. It has been found that each person produce 35 to 85 grams of solid sludge per day. In recent years, waste production has increased dramatically in developing nations such as India. There are two methods to solve the problem such as disposal of solid waste (dry sludge) including land filling and using dry sludge as fertilizers. However success of these method depend highly on quality of the dry sludge and in some instances not so fully dried sludge may create land ,air and water pollution. A fully dried sludge from sludge drying beds of sewage treatment plant is used to replace soil in various places

II. OBJECTIVES:

1. To suggest alternative to conventional brick.
2. To design light weight brick.
3. To achieve strength and feasibility.
4. To examine the effect dry sludge in brick properties.
5. To utilize dry sludge as ingredients of brick for construction.
6. To try to reduce pollution.
7. To find if the compressive strength of bricks made using sludge is compatible with conventional brick.

III. MATERIAL USED.

- Dry sludge.
- Soil.
- Sand.
- Water.
- Plastic fibers.
- Fly ash.

IV. METHODOLOGY

- ❖ Collection of materials from various sources.
 - Collection of sludge, fly ash, soil, sand (murrum) ,plastic fibers, natural fibers & water etc.
- ❖ Test on materials in college laboratory.
 - Test on sludge: specific gravity of sludge, dry density of sludge, compressive strength ,water absorption.
- ❖ Mix design of bricks.
 - (1) Percentage of sludge, soil, fly ash, sand (murrum),waste plastic material is decided.
 - (2) Manufacturing of bricks on site.
 - Weight batching
 - Mixing of material
 - Casting of bricks
 - Placing of bricks
 - Burning of bricks
- ❖ Testing of bricks in college laboratory.
 - Water absorption test.
 - Compressive strength test!

V. EXPERIMENTAL IMPLEMENTATION AND RESULTS

Results of Water Absorption Test.

Observation Table:

Sr.no.	10%	20%	30%	60% F A	70% F A	80% F A
Water Absorption(%)	17.37	18.99	17.83	-	-	-

Result: Weight of bricks cannot be measured due to disintegration of bricks.

Remark: By study of the table shows that bricks having sludge percentage more than 60% does not withstand its proper shape in water absorption test.

Results Of Compressive Strength Of Bricks.

Observation Table:

Sludge (%)	Compressive Strength (N/mm ²)
60 Fly Ash	1.2
70 Fly Ash	0.6
80 Fly Ash	0.5

VI. CONCLUSION

1. Bricks having sludge percentage more than 60% does not withstand its proper shape in water absorption test.
2. Water absorption rate is high of sludge used bricks.
3. Tests results proved that bricks which are manufactured using sludge more than 50% are not as per satisfactory standards.
4. Compressive strength of bricks manufactured using high percentage of sludge is low compare to conventional bricks.
5. The bricks manufactured by replacing soil in a conventional brick by dry sewage sludge the tune of 60%, 70% and 80% show reduction in compressive strength and do not withstand water absorption test due to loosing its geometric shape and getting converted into flow state.
6. Based on limited experimental investigation it is observed that compressive strength decrease when replacement of soil with dry Sludge percentage increases.

REFERENCES

- [1] S.K Gulhati,. and M Datta (2005), “Geotechnical Engineering” Tata Mcgraw Hill, Delhi.
- [2] Bureau Of Indian Standards “IS 3495- Part 1- 1992 Compressive Strength of Bricks”.
- [3] Joo-Hwa Tay (2003) “Bricks Manufactured From Sludge”
- [4] Anyakora Nkolika Victoria (2013) “Characterisation And Performance Evaluation Of Water Works Sludge As Bricks Material”
- [5] Pravin A. Patil, Dr. M. Mohmmad(2010)”Utilization of Waste Sludge in Brick Making”
- [6] . Aeslina Binti Abdul Kadir, Ahmad Shayuti Bin Abdul Rahim (2009) “An Overview of Sludge Utilization into Fired Clay Brick”
- [7] Shrutakirti A. Mahajan, Dr. M. Husain(2002). “Utilization of Waste Sludge in Brick Making”

