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Brick Manufacturing by using Waste Plastic and Sand

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Abstract: *The exponential rise in the production of plastic and the consequential surge in plastic waste have led the scientists and researchers look out for innovative and sustainable means to reuse/recycle the plastic waste in order to reduce its negative impact on environment. Construction material, converting waste plastic into fuel, household goods, fabric and clothing are some of the sectors where waste plastic is emerging as a viable option. Out of these, construction material modified with plastic waste has garnered lot of attention. Modification of construction material with plastic waste serves a dual purpose. It reduces the amount of plastic waste going to landfills or litter and secondly lessens the use of mined construction materials, thereby mitigating the negative impact of construction industry on environment. This paper summarizes the developments with regard to the use of plastic waste as a constituent of construction material. Inclusion of plastic waste as a binder, aggregate, fine aggregate, modifier or substitute of cement and sand in the manufacturing of bricks, tiles, concrete and roads has been comprehensively reviewed. Also, the influence of addition of plastic waste on strength properties, water absorption, durability, etc. has been thoroughly discussed. The research studies considered for this review have been categorized based on whether they dealt with the use of plastic waste for bricks and tiles or in concrete for road construction.*

Keywords: Waste Plastic, Conventional bricks, Compression Test, water absorption Test, Efflorescence

I. INTRODUCTION

Brick is one of the most common masonry units used as building materials. Building materials like bricks, concrete block, tiles are popularly used in construction and these materials are expensive and find it difficult to afford easily. A large demand has been placed on building material industries especially in the last decade owing to the increasing population which causes a chronic shortage of building materials. Recycling of waste plastic in construction work as raw material alternative may contribute in the exhaustion of the natural. Plastic is a nonbiodegradable waste material. Plastic waste is increasing due to increase in population, urbanization and development. Many people throw out plastic after using it. It is not decomposed easily and affect the growth of plants. So, vegetation gets affected. It is also harmful to animals when consumes it. Plastic waste is increasing due to increase in population, urbanization and development. To overcome these defects, we can use the plastic in construction sector as raw materials in different ways. The reuse of plastic waste in building constructions, industries are considered to be the most practicable applications. Plastic can be reused in various sectors like marketing, manufacturing and transportation etc. Plastic waste along with being non-biodegradable also causes land and water pollution. Among the various types of plastics used, Polyethylene (PE) is one of the most used. It is usually used in single use plastics such as carry bags, plastic bottles etc. One viable solution to using this plastic waste can be Plastic bricks. These bricks will eventually be able to enhance our management of plastic along with promoting sustainable development. Traditional Bricks are made by clay, which puts stress on soil and also leads to soil erosion. The use of plastic sand bricks can be beneficial and would

II. LITERATURE REVIEW

1.) Miss. P. Subhadra et al: Volume- 5, Issue-01, Jan.-(2022): - Brick is one of the most common masonry units used as building material. Due to the demand, different types of waste have been investigated to be incorporated into the bricks. There has been a considerable imbalance between the availability of conventional building materials and their demand

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in the recent past. On the other hand, the plastic waste is abundantly available and the disposal of waste plastics is a biggest challenge,help to reduce waste. Thus, the use of plastic bricks is a promotion to sustainable development and Eco conservation at the same time.

2.) Mr. Aman Kumar et al (2020): Present a report on Manufacturing Bricks from Sand and Waste Plastics, this report concludes that, making bricks from sand and waste plastics can be an alternative to the available traditional clay bricks. Sand plastic bricks have lower water absorption (1.5%), bulk density(1.497Kg/L), and apparent porosity when compared with those of normal clay bricks. Sand plastic bricks have near same compressive strength(5MPA) than normal clay bricks (4.3 to 6.9) Plastic brick have low weight compression to normal brick. Waste plastics which is available everywhere may be put to an efficient use in brick making. Sand plastic bricks can help reduce the environmental pollution thereby making the environment clean and healthy

3.) Mr. C. Selvamani et al (2019): Present a report on preparation of brick using sand and plastic bottles, this report concludes that. Waste plastic, which is available everywhere, may be put to an effective use in brick making. Plastic sand bricks can help reduce the environmental pollution, thereby making the environment clean and healthy. Plastic sand bricks reduce the usage of clay in making of bricks. Plastic sand bricks give an alternative option of bricks to the customers on affordable rates. Water absorption of plastic sand brick is zero percent. Compressive strength of plastic sand brick (8.6N/mm2) is more than compression to the normal red brick (5.58N/mm2) they perform the test at different - different ratio (1:3) is very good for high compressive strength ratio.

4.) Prof. A. S. Moon et al issue 4 April (2022): Present Ecological brick by use of west plastic & sand, this report concludes Waste plastic, which is available everywhere, may be put to an effective use in brick. Plastic bricks can help reduce the environmental pollution, thereby making the environment clean and healthy. Plastic sand bricks reduce the usage of clay in making of bricks. Plastic sand bricks give an alternative option of bricks to the customers on affordable rates. it reduces the weight of brick compression to normal brick. Water absorption of plastic sand brick is zero percent.

III. METHODOLOGY

The materials used for the fabrication of the plastic sand bricks are the PET bottles and river bed sand. For this plastic PET bottles are collected and sorted. Generally, the cold drinks bottle is made of PET and those bottles are used for the purpose of fabricating the bricks. The PET bottles cannot be used as they are in usual shape and size, for our use the bottles need to be cut into smaller pieces of same size. First of all, the bottles are cleaned and dried to remove moisture. Then these bottles are cut into smaller pieces, in this case we used a shredder for shredding the plastic into smaller pieces. The plastic is melted in a drum and sand is mixed with it form the bricks.

Collection of material The process is incredibly simple. Put the dustbin in the canteen for collection of waste bottles. Select the plastic bottles of cold drinks and water from canteens. Bring river sand for plastic brick. IS2386 (Part- I) The more you collect the more plastic you will divert from the landfill or clean up out of the environment. Fixing the proportion of sand & plastic For the fabrication of plastic sand bricks, plastic and sand are mixed in different proportions `plastic and sand are made. Plastic and river sand are mixed in different ratios 1:2, 1:3, 1:4. The reason behind taking different proportions of plastic and sand is to find the optimum proportion which gives the desired results. The bricks made of these ratios will further be investigated for various desired properties. Preparation of brick mould The moulds used are wooden moulds and are made in the carpentry shop. All the sides and surfaces of the mould should be even for the brick to have better surface finish. Both fixed and movable moulds can be used for the purpose. Wooden mould will be cost effective and serve the purpose whereas if better surface finish is needed then cast-iron moulds can be used. Mould size would be (230*100*75) mm

IV. MATERIALS AND METHODS

Manufacture of mould Handmade wooden mould has made in the dimension of 20cm X 9cm X 9cm. since dimension of normal brick was 19 cm X 9 cm X 9 cm is recommended as per BIS. Sand Natural river sand was used as a fine aggregate. The properties of sand were determined by conducting tests as per IS: 2386 (Part-1). The results are shown in test data of materials. Waste Plastic Plastic is material consisting of any of a wide range of synthetic or semi-synthetic organic compounds that are malleable and so can be molded into solid objects. While most plastics are

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produced from petrochemicals, bio plastics are made substantially from renewable plant materials such: as cellulose and starch. The widespread generation of plastics waste needs proper end of-life management. The highest number of plastics is found in containers and packaging's (i.e., bottles, packaging, cups etc.), but they also are found in durables (e.g., tires, building materials, furniture, etc.) and disposable goods (e.g., medical devices). Post-production and postconsumer plastics are utilized in a wide range of applications. The following Results were taken from Chennai central institute of plastic engineering and technologies Due both to the finite limits of the petrochemical reserves and to the threat of global warming, the development of bio plastics is a growing field. They are broadly classified into two categories they are thermoplastics and thermosetting plastics. Thermoplastics are the linear polymers, which become soft on heating and become hard on cooling

Advantages of Ecological Brick by Use of Waste Plastic and Sand

1. The main benefit of eco-bricks is that they transform something that would have been harmful to the environment into something that benefits local communities. 2. Plastic is an extremely useful material, but we produce far too much of it and dispose of it in an environmentally unsustainable manner. Plastic's hardness, lifespan, and water resistance, which make it so difficult to dispose of, are also what make it a fantastic building material. 3. Each brick contributes to the reduction of discarded plastic in the world and is produced at a lower cost and with less energy than traditional bricks. It also consumes less energy than recycling plastic into other forms. 4. When you see the amount of rubbish you put into an eco-brick, you'll see how much you throw away. This process also helps you be more careful about what you buy and how you dispose of it. 5. Eco-bricks help prevent hazardous material from being burnt or ending up in the ocean. When plastic is burnt, it emits CO2, increasing carbon emissions and contributing to global warming

V. CONCLUSION

In this project, the plastic is used as the binder material so it restrict the absorption of water and also provides the good plasticity to the brick. So hence this type of bricks also resist the earthquake loads. This type of plastic bricks have high compressive or crushing strength at the ratio (1:3). And also has less absorption value when compared to normal conventional burnt clay bricks. So hence the plastic sand brick ratio 1:3 is preferable for the usage for the constructions. By use of plastic sand bricks, the water absorption was highly reduced. This plastic sand bricks are used as foundation bricks below the plinth level in order to avoid the seepage of ground water. Also the study presented above helps in reducing the plastic waste disposal problem and converts that useless waste material into a useful construction material. The main drawback of this type of waste plastic sand bricks are easily get fire at normal fire. So this type of bricks can be used at underwater construction, underground construction and also used for underground septic tank construction. Because this type of bricks can withstand high load than the normal brick. Hence the main aim of this project was to reduce waste plastic in our environment by utilizing as a material for the building construction. Since by using in the underground construction the plastic also get degraded naturally.

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