



A Review of analysis of Paver Block Containing with Recycled Plastic with Different parameters

Anshul Vishwakarma¹ and Mr. Praveen Singhai¹

¹Department of Civil Engineering, Lakshmi Narain College of Technology Bhopal (M.P.)

ABSTRACT -

A large number of plastic waste has been collected from several places such as tourist and public places, etc., and high-density polyethylene bags are collected, cleaned, and used as a substitute for cement in paving block manufacturing. Waste plastics are available in large quantities and thus the cost factor goes down. When we have plastic waste, we can use it to reuse, recycle and reduce. Be mindful of what you do, pay attention to the items you buy, and always check yourself to see if you need them or if they come in a package with less waste. The objective of this project is to replace cement with plastic waste in paving block and reduce paving block cost compared to traditional concrete paving blocks. The rate of decomposition of plastic waste is also a very slow process. Hence the project is beneficial in reducing plastic waste in a beneficial way. In this project, we used plastic waste in different proportions with quarry dust, coarse aggregate and ceramic waste. The paving blocks were prepared and tested, and the results were discussed.

Keywords: Plastic waste, Less in plastic, High in plastic, Paving blocks.

1 INTRODUCTION

Paving block pavers are versatile, aesthetically attractive, functional, cost effective and require little or no maintenance if manufactured and positioned correctly. The performance of most concrete block pavers constructed in India has also been satisfactory, but two main areas of concern are accidental failure due to excessive surface abrasion, and discrepancy in block strength. Natural resources are being depleted all over the world at the same time the waste generated from industry and residential area is increasing exponentially. The sustainable development of construction involves the use of non-traditional and innovative materials, recycling of waste in order to compensate for the shortage of natural resources and finding alternative ways to preserve the environment. With the aim of investigating the behavior of quarry rock dust, recycled plastic, and plastic paving block production from solid waste, a critical review of the literature was performed. An attempt was made by Nivetha C et.al to reuse dust fly ash from solid waste quarry and PET with the aim of not losing strength away from the original paving blocks. By feedback of test results, PET can be reused with 50% quarry dust and 25% fly ash in the plastic paving block.

The physical and mechanical properties of the materials used in the plastic paving blocks were investigated. For testing, 6 cubes were cast to measure the compressive strength. Satish Parihar et al. used recycled plastic aggregate in different proportions in the concrete mix and checked its stability. The amount of plastic waste accumulating in the 21st century has created significant disposal challenges, and thus requiring authorities to invest in encouraging the use of coarse plastic waste in concrete is key to a thriving construction industry. Three replacement levels of 10%, 20%, and 30 by weight of aggregate were used to prepare the concrete.

2 LITERATURE REVIEW

Poonam Sharma et al. Discussion on cement concrete paving blocks for rural roads. The study by Joel Santosh and Ravikant Taluri indicated that fly ash and wasted glass powder can be used effectively as paving blocks produced from ordinary cement in Nigeria, and they performed very well except for failures due to excessive surface wear (abrasion), variation in their strength such as as well as weed growth /Algae inside the interlock space. Natural resources such as limestone used in the cement industry are constantly being depleted globally while the production of waste, especially plastic, is increasing on a daily basis, leading to an imbalance in the sustainability of our cherished environment. Therefore, the construction sector needs unconventional and innovative materials, the availability of which is not a challenge in order to replace the dwindling natural resources [1].

Interlocking pavers are dry mix precast concrete blocks commonly used in outdoor landscape paving applications. Strength, durability, and aesthetically pleasing surfaces have made paving blocks attractive for many commercial, municipal, and industrial applications such as parking areas for both residential and commercial areas, pedestrian paths, and main and subsidiary roads, [2]. Paving block is versatile, aesthetically attractive,

practical, cost-effective and requires little or no maintenance if manufactured and placed correctly. The causes of road failure in Nigeria as identified by many researchers include poor building materials, poor design and specifications, use of roads, use of non-professionals, poor drainage, geological and geotechnical factors.

The proximity of the saturated zone to the surface of the earth and the manner of oscillation of this zone have a direct impact on the geotechnical properties of the soil. These in turn affect the stability of engineering structures such as homes, bridges, dams, and roads [3-4]. Interlocking permeable concrete pavers are the best option for effective rainwater management and surface/subsurface drainage interactions. Pores of water under pressure rise under road pavements in swampy sites through capillary movement to the surface above groundwater level and can adversely affect the pavement structure if there is insufficient subsurface drainage facility [5-6]. The use of plastics increased from 5 million tons in the 1950s to 100 million tons in the 2000s. The challenge of waste disposal has become one of the most serious environmental problems facing many cities in Nigeria. High-density polyethylene (HDPE), low-density polyethylene (LDPE), and polyethylene (PE) are non-biodegradable plastics and pose a threat to the environment [7-8].

3 MATERIALS USED IN THE USED PLASTIC PAVING MOLD

Plastic waste in the home is large and increases over time. The largest component of waste plastics is polyethylene, followed by polypropylene, polyethylene terephthalate, and polystyrene. Considering the global issue of environmental pollution from post-consumer plastic waste, the use of post-consumer plastic waste in concrete will not only be a safe disposal method, but may also improve concrete properties such as tensile strength, chemical resistance, drying shrinkage, and creep in the short and long term .

1. Good insulation of cold, heat, energy and sound saving.
2. Compared with concrete block, it is economical.
3. Hygienic and clean
4. Easy processing/installation
5. Light weight
6. No maintenance required (such as paint reduction)

3.1 MIX DESIGN (1:3)

In this manufacturing process, the design of the plastic paving block mix is not calculated correctly. This mix design is based on trial and error method during the manufacturing process.

3.2 PLASTIC WASTE COLLECTION

The manufacture of plastic paving blocks requires a bulky plastic material. The weight of the plastic is very small so the amount of plastic is required in a huge amount. A 1 kg plastic requires 4 kg of sand. Sand is another material used in plastic paving blocks. The amount of sand depends on the plastic used for the blocks.

3.3 PREPARATION OF THE MIXTURE

Plastic bags are assembled and do not need to be cleaned but are stored and cleaned virtually. Weigh the plastic and sand in proportion to the first part and the second part of the plastic. The rate of sand and plasticity depends on the type of product. The quantity of the mixture is determined to facilitate handling and transportation.

3.4 HEATING THE MIXTURE

The mixture is gradually heated in a recycled half barrel with continuous and vigorous mixing. Take the barrel and heat at a constant temperature and put the plastic in an appropriate weight. After melting the plastic slowly add sand in a good proportion. Stir this mixture constantly. While mixing, take care of proper mixing. The composition of the gas and steam produced during melting consists mainly of carbon dioxide and H₂O however it is recommended that the operator wear a suitable face mask.

3.5 CASTING

The plastic putty is still very hot and the liquid is poured into the mold and tightly leveled with a trowel. Then it is compacted with a custom tool designed according to the shape of the paving block.

3.6 DEMOULDING

When the plastic is cool enough, the extraction of the paving block from the mold is immediate. It just requires a gentle pull from the mold. The paving block on a metal support is immersed in a tank with cold water.

4 CONCLUSIONS

Plastic is a highly polluting component in nature, so it is used in paving blocks to reduce pollution in the area. The finish, shape, interlocking and appearance of the plastic paving block are as good as the traditional concrete paving block. The strength of the block is much lower than that of a concrete block, so such blocks are not used in heavy traffic. These blocks are used in the garden and on the footpath on the road. It is also used in making leaning stone, and side guard in road construction. When we did the water absorption test on plastic paving block, we noticed that the plastic content is more than 50% and then the water absorption capacity of the block is i.e. more than 2% compared to other blocks.

REFERENCES

- [1] Mohan D.M, Vignesh, Utilization of plastic bags in pavement blocks. Volume:119, No15 ,1407-1415 ISSN: 1314-3395.,(2018)
- [2] V. Natraj “Utilization of Waste Plastics as a Partial Replacement of Coarse Aggregate in Concrete Blocks, ISSN:0994-5645, Vol:08, Issue:12, June (2015).
- [2] Joel Santhosh. Ravikant Talluri.Manufacture of Interlocking Concrete Paving Blocks with Fly Ash and Glass Powder. International Journal of Civil Engineering and Technology, ISSN:55-64, Vol:06, Issue:04 (2015).
- [4] R.L. Rame, Recycled plastics used as coarse aggregate for constructional concrete, project reference no 37S1114, ISSN:2319-8753, Vol:02, Issue :03, March (2013)
- [5] Ganesh Tapkire. Satish Parihar. Pramod Patil. Hemra, R. Kumavat,Recycled Plastic used in Concrete Paver Block. International Journal of Research in Engineering and Technology, ISSN:2321-7308: Vol.3, Issue 09, (2014)
- [6] B.Shanmugavalli, B. Eswara Moorthy, Reuse of Plastic Waste in Paver Blocks, ISSN:2278-0181: Vol. 6 Issue 02, February-(2017).
- [7] Raghatate Atul M,Use of plastic in a concrete to improve its properties, ISSN2249–8974 IJAERS/Vol. I/ Issue III/April-June, 2012/109-111
- [8] Praveen Mathew et al, Utilization of plastic bags in concrete block, Literature Review, Volume 2, Issue 6 JETIR ISSN-2349- 5162.June(2015)