International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 09 Issue: 05 | May 2022 www.irjet.net p-ISSN: 2395-0072

Plastic paver blocks

Lins Paul Kuriakose[1], Alen Varghese Paul[2], Ashfaq Navas[3], Fathimath Suhara P.A[4], Rensho Binu[5]

[1]Assistant Professor, Department of Civil Engineering, Viswajyothi college of Engineering and Technology, Vazhakulam, Kerala, India
[2, 3, 4,5] UG Scholars Department of Civil Engineering, Viswajyothi college of engineering and technology, Vazhakulam, India

---

Abstract - *The purpose of this study is to replace cement in paver blocks with plastic waste, cutting paver block costs when compared to concrete paver blocks, which are more expensive currently on the market. At present, India produces plastic trash amounts to roughly 3.5 million tonnes every year. But the fact is that the rate of decomposition of plastic garbage is also very sluggish. As a result, our project contributes to the reduction of plastic waste and its conversion into a usable resource. In this experiment, we combined plastic trash with quarry dust, coarse aggregate, and ceramic powder in various amounts. The paver blocks were produced and tested, with positive results. It is most economical and environmental friendly solution present in the construction industry for plastic wastes.*

Key Words: Ceramic powder, Plastic waste, Compressive strength

1. INTRODUCTION

1.1 General

Plastics are hazardous material due to the difficulty of decomposition. But also the utilisation of plastic is growing by the day in our life. Here we aim to convert the waste plastic into a paver block. Plastic we used here is collected from a plastic recycling unit. In a year, currently about 3.5 million India dumps thousands of tonnes of plastic waste. The rubbish that has been dumped pollutes the environment. As a result, it has an impact on both humans and animals both direct and indirect methods. Plastic trash can be used to substitute cement, which has both environmental and economic benefits.

Objectives

a) To devise a method for efficiently and effectively utilising waste plastics.

b) To reduce natural resource usage in the production of blocks and paving bricks.

b) Minimize and reuse waste plastic generation on land and water to prevent land and water degradation and pollution hazards.

d) To manufacture materials that are affordable to the average person.

Scope

a) Significant amount of plastic waste is removed

b) Increases self employability

c) Innovative method to convert plastic waste to usable product.

2. METHODOLOGY

a) Collection of plastic waste.

b) Clean and dry the plastic waste

c) Break up the plastic garbage into little pieces.

d) Melt the plastic

e) Add various components at right proportion at right time

f) Clean the mould and add the mix

g) After 24 hours the block is ready to use

3. EXPERIMENTAL PROCEDURE

3.1 Properties of Material

Plastic waste (LDPE)

Plastic waste is collected from a plastic recycling unit. Resin number 4 indicates LDPE. It is used for plastic bags, tubes, wash bottles etc. These plastics were collected and cleaned and crushed and ready to melt. The fundamental qualities are listed below.

Table 1: Properties of LDPE

Sl. No	Particulars	Value
1	Melting point	150^0
2	al co efficient of expansion	$100\text{-}200X10^{-6}$
3	Density	0.910-0.940
4	Tensile Strength	0.20-0.40(N/mm^2)

Coarse Aggregate

Aggregates used in this work is collected from a quarry site. Aggregates that pass through a 12mm sieve and are retained on a 10mm sieve are sieved and tested according to Indian standard IS:383-1970.

Quarry dust

Sand that is less than 4.75 mm in size is crushed used here. The quarry dust used here is obtained from near by quarry site and the properties are listed below.

Table 2: Properties of Quarry Dust

Sl.No	Description	Value
1	Specific gravity	2.62
2	Grading zone	Zone II of soil
3	Fineness modulus	2.952
4	Water absorption	1.80

Ceramic Waste

The ceramic waste that is employed in this endeavour is the main waste from the world of ceramics. Getting rid of these wastes necessitates a considerable amount of space, hence we use these powder in our two mixes. This powder increases the bonding between the constituents. It normally replaces the the cement in this mix.

3.2 Mix Ratio

We are using three mix ratio and compare the strength in each mix. For the first mix we are using plastic waste, quarry dust and coarse aggregate at a ratio of 1:0.75:0.75. In second mix an additional component called ceramic powder is also used. Here the components are plastic waste, quarry dust, aggregate and ceramic powder at ratio 1: 1.5: 2: 0.75. In third mix coarse aggregate is replaced by fine aggregate and casting is done.

3.3 Preparation of Blocks

Figure 1: Mix preparation

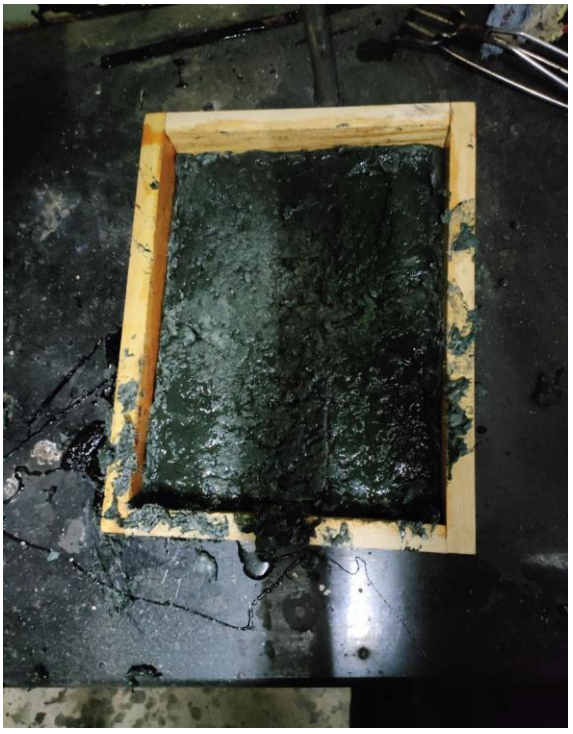

Figure 2: Transfering to mould

Figure 3: Plastic brick

4. TESTING OF SPECIMEN

4.1 Compressive Strength

Plastic paver blocks of size 200mm*100mm*5mm is casted. The reading of maximum load at failure is noted and compressive strength is calculated. The formula for compressive strength is given below:

Compressive strength (N/mm^2) = (Ultimate load (N)/ Area of cross section (mm^2))

Figure 4: Compression Test

4.2 Water Absorption Test

This is a test that determines the moisture content of soil as a percentage of its dry weight. The sample is weighed, then dried in the oven before being reweighed under controlled conditions.

5. RESULT AND DISCUSSION

5.1 Compressive Strength

Compressive strength of each blocks of three types of mixes were tested and obtained. The values of compression test is listed below in the table.

Table 3 : Compressive strength (C.S) values

Mix No	Plastic Waste	Coarse Agg	Fine Agg	Quarry Dust	Ceramic Powder	C.S (N/mm^2)
1	1.00	0.75	0.00	0.75	0.00	9.83
2	1.00	2.00	0.00	1.50	0.75	10.61
3	1.00	0.00	2.00	1.50	0.75	12.95

From the table it is clear that mix 3 has highest value of Compression strength.

1.1 Water Absorption Test Value

Water absorption test values are listed below in table:

Table 4 : Water absorption (W.A) values

Mix No	Plastic Waste	Coarse Agg	Fine Agg	Quarry Dust	Ceramic Powder	W.A
1	1.00	0.75	0.00	0.75	0.00	9.2
2	1.00	2.00	0.00	1.50	0.75	9.1
3	1.00	0.00	2.00	1.50	0.75	9.9

CONCLUSION

This project deals with the construction and testing of plastic paver blocks. The aim of this project is to reduce the waste plastic that is generated in our country by converting them to a useful product. Plastic paver blocks can aid in the reduction of environmental contamination, resulting in a clean and healthy environment. This concept is original and novel in that it addresses the problem at a macro level while solving it from a micro perspective. Plastic paver blocks are economical when compared to normal concrete blocks. It also shows good compressive strength and water absorption test value. This block is preferred to use in less load bearing areas like walk ways, garden etc.

REFERENCES

[1] Dinesh S; Dinesh A; and Kirubhakaran K., "Utilisation of Waste Plastic in Manufacturing of Bricks and Paver Blocks" International Journal of Applied Engineering Research, Vol.2 (4), pp. 364- 368.

[2] Maneeth P D; Pramod K; Kishor Kumar; and Shanmukha Shetty., "Utilization of Waste Plastic in Manufacturing of Plastic- Soil Bricks" International Journal of Engineering Research & Technology, Vol.3 (8), pp.529-536.

[3] Puttaraj M.H; Shanmukha S; NavaneethRai.P.G; and Prathima.T.B, "Utilization of Waste Plastic In Manufacturing of plastic-Soil Bricks" International Journal of Technology Enhancement and Emerging Engineering Research, Vol. 2(4), pp. 102-107

[4] Nitin Goyal ; Manisha., "Constructing structures using eco- bricks", International Journal of Recent Trends in Engineering & Research, Vol.2(4), pp. 159-164.

BIOGRAPHIES

Lins Paul Kuriakose
Assistant Professor
Department of Civil Engineering
Viswajyothi College of Engineering and Technology, Vazhakkulam, Kerala

Alen Varghese Paul
4th year student, Civil Engineering
Viswajyothi College of Engineering and Technology, Kerala

Ashfaq Navas
4th year student, Civil engineering
Viswajyothi College of Engineering and Technology, Kerala

Fathimath Suhara P.A
4th year student, Civil engineering
Viswajyothi College of Engineering and Technology, Kerala

Rensho Binu
4th year student, Civil engineering
Viswajyothi College of Engineering and Technology, Kerala