Waste Plastic Use in Paver Block

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Abstract— Plastic is a non-bio-degradable substance which takes thousands of years to decompose that creates land as well as water pollution to the environment. The quantity of plastic waste in Municipal Solid Waste (MSW) is expanding rapidly. It is estimated that the rate of usage is double for every 10 years. Plastics are rapidly growing segment of the municipal solid waste. Disposal of waste materials including waste plastic bags has become a serious problem. Amount of waste plastic bags being accumulated in 21st century has created big challenges for their disposal. The waste plastics in house hold is large and increases with time. In each country waste consumption is different, since it is unaffected by socioeconomic characteristics and waste management programs, but the level of plastics in waste consumption is high. In order to overcome this issue, we have to use it in effective way. This project is about recycling waste plastics into pavement blocks and study their characteristics. Pavement blocks are perfect materials on the pathways and streets for simple laying and finishing. Here the strength properties of pavement blocks comprising of waste plastics and the design considerations for pavement block incorporating waste plastic bags is presented. It will be a boon to modern society and environment. The main aim is to use the plastic nature in construction fields with limited additions. It will be definitely a cost economical and can be applied in different form. Polyethylene (PE) bags are cleaned and added with fine aggregate at various ratios to obtain high strength bricks that possess thermal and sound insulation properties. This is one of the best ways to avoid the accumulation of plastic waste. It also helps to conserve energy, reduce the overall cost of construction and hence in this project, an attempt made to manufacture the plastic sand bricks by utilizing the waste plastics.

Keywords: Plastic waste, low density polyethylene, polyethylene properties, plastic sand paving block, paving block

I. Introduction

The composition of waste is different in different areas based on the socioeconomic characters, waste management programs and consumption patterns but the amount of plastic in the overall waste composition is high. The major constituents of plastic waste are polyethylene and polypropylene. There are several methods available to recycle and reuse the waste effectively. Since plastic has long service life, they can be recycled effectively.

Consider the available statistics: A global material balance study on plastics points out that 79 per cent of the total plastics produced in the world enters our environment as waste. Only 9 per cent of the total plastic waste in the world is recycled. A Central pollution control board (CPCB) report (2018-19) puts the total annual plastic waste generation in India at a humungous 3.3 million metric tonnes per year. Even this data, frightening as it is, might be an underestimation. While India's plastic waste problem is not as huge as that of the rich world, it is definitely growing. Richer states like Goa and Delhi produce as much as 60 grams and 37 grams per capita per day respectively – against a national average of 8 grams per capita per day.

II. Properties of Materials

A. Plastic Waste

Plastic in any synthetic or semisynthetic organic polymer. In other words, while other elements may be present, plastics always include carbon and hydrogen. While plastics may be made from just about any organic polymer, most industrial plastic is made from petrochemicals. Thermoplastics and thermo setting polymers are the two types of plastic. The name "plastic" refers to the property of plasticity, which is the ability to deform without breaking.

1) Properties of Waste Plastic

S.NO	DESCRIPTION	RESULTS
1	Specific gravity	1.4
2	Water absorption	0.5%
3	Density	1130 kg/cubic m
4	Melting point	150°

B. M-SAND

Manufactured sand is an alternative for river sand. Due to fast growing construction industry, the demand for sand has increased tremendously, causing deficiency of suitable river sand in most part of the word.

Due to the depletion of good quality river sand for the use of construction, the use of manufactured sand has been increased. Another reason for use of M-Sand is its availability and transportation cost.

1) Properties of M-SAND

S.NO	DESCRIPTION	RESULTS
1	Specific gravity	2.68%
2	Water absorption	2.2%
3	Fineness	2.72
4	Grading zone	II
5	Density	1830kg/cubic m

C. Quarry Dust

Crushed sand less than 4.75 mm is produced from rock using state of crushing plants. Production of quarry fines is a consequence of extraction and processing in a quarry and collected from the near-by quarry.

1) Properties of Quarry Dust

S.NO	DESCRIPTION	RESULTS
1	Specific gravity	2.62
2	Water absorption	1.82%
3	Fineness	2.952
4	Grading zone	II

