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UTILIZATION OF WASTE PLASTIC IN PAVER BLOCKS

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Abstract –Plastic is a non-biodegradable material. The amount of plastic waste in municipal solid waste is extending quickly step by step. Plastic is produced using hydrocarbons found in various sources like oil, coal and some different minerals. At the period of scarcity, plastic is seen as helpful yet after its utilization, it is essentially discarded, making a wide range of perils Plastic is of various kinds, for example, High Thickness Poly-ethylene (HDPE), Low thickness poly-ethylene (LDPE), and so forth. Subsequently, these waste plastics is to be successfully used in making paver squares. low thickness polyethylene are spotless included with the sand and aggregate at different rates to get high quality blocks that have warm and sound protection properties to deal with contamination and to decrease the general expense of development, this is probably the most ideal approaches to keep away from the collection of plastic waste which is a non-degradable toxin. The point of this task is to supplant the holding by concrete in paver hinders with the dissolved plastic waste. Around 5.6 million tons of plastic waste is produced in the nation per annum. The debasement of plastic is extremely long procedure, it might take a great many years. Henceforth, venture is useful in lessening the plastic waste. In this venture, we have utilized plastic waste in various proportion with fine and coarse aggregate. The paver squares were arranged and tried. The water retention limit of plastic paver square is less. The outcomes indicated more quality when contrasted with paver square

Key Words: Plastic Waste, LDPE, Compressive Strength

1. INTRODUCTION

Plastic is considered as non-inexhaustible asset since it is non biodegradable. It takes 1000 years for deterioration. Almost 56 lakhs huge amounts of plastic waste is created in India every year. Plastic waste needs legitimate finish of life the board. Plastic is inventive material for utilizing it in development purposes. Plastic application is connected with their uncommon properties, low thickness, simple preparing, great mechanical properties, great concoction opposition, astounding warm and electrical offending properties and ease. Strong waste administration is one of the major ecological worries in India. Landfills are getting scant and the expense in building landfill destinations are expanding. During transportation of squanders from homes and ventures by these exchange station to the dumping destinations some aftermath from the trucks into canals. In any case, by and large the degree of plastics in squander organization is high. The biggest segment of the plastic waste is polyethylene, trailed by polypropylene, polyethylene Terepthalate and polystyrene Luckily, there are different manners by which squander plastics could be reuse or changed over to different items. High thickness polyethylene (HDPE) squander is utilized in making packs and dustbins. Polymer adjusted asphalt squares has applications in street development and buildings. Consequently squander plastic sacks can subsequently, be blended in concrete mass in some form, without noteworthy impact on its different properties or slight trade off in quality. In this task squander plastic sacks gathered from city strong waste and utilized in the creation of asphalt squares which by and large utilized in the park , side of the road trails and in the yard of building .

1.1 Concrete PavingBlocks:

Concrete blocks are mass manufactured to standard sizes. This block has excellent interlocking characteristics, durability and has great aesthetics. Brick pavers, concrete paver, granite paver, rubber paver and stone pavers are various types of pavers widely used. But for manufacturing plastic paver blocks, cement, quarry dust, crushed aggregates, coarse aggregates and plastic waste are essential. Both ordinary and plastic paver blocks are design for same grade and compared by its durability and compressive strength. The study by typical concrete paving blocks has one smooth.face and

one rough, although some paving blocks so come with reversible surfaces (can be used both sides). The performance characteristics of concrete paving blocks make it suitable for the heaviest duty applications, able to support substantial loads and resist shearing and braking forces. These blocks come in different colours. The colours typically come from metallic oxides. Paving blocks are the most preferred choice for laying of pavements, driveways as it can be immediately open to the traffic after fixing up.

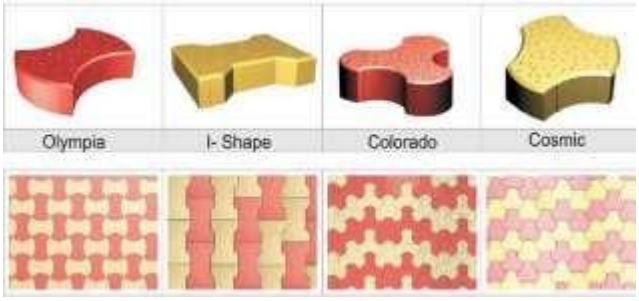

Fig no 1: Different shapes of paver blocks

2. LITERATUREREVIEW

In this chapter, the research work concern to the various application and methods used for making plastic paver blocks. In this experimentation, paver blocks made with plastic with fine aggregate is discussed. This chapter gives a comprehensive review of the work carried out by various researchers in the field of using plastic in paver blocks.

(1) B. Shanmugavali et. al., (2017)

The present literature is based on plastic waste management. For this author used waste plastic in paver blocks. Different materials like plastic waste (LDPE), quarry dust, coarse aggregates, ceramic waste were tested for their proportion and chemical composition. Three different mix ratio is selected for casting paver blocks and test specimen is prepared and tested for compressive strength test and oven test. After testing it is shown that compressive strength is low thus can be used in non-traffic and low traffic road also the waste is reduced because of use of waste plastic.

(2) Thirugnanasambantham et. al., (2017)

In this paper we studied that the author has used polyethylene bags as binding material with fine aggregates. Different materials like cement, sand, fly ash were tested to know there physical properties and chemical composition. Paver blocks were casted with proportion (1:3, 1:4, 1:5) for plastic sand. Compression strength, water absorption, efflorescence, hardness, fire resistance, soundness test were conducted on blocks. Results are compared with fly ash bricks. After testing, it is shown that, the plastics paver gives more strength when compared with fly ash bricks. The water absorption and presence of alkalies was highly reduced.

3) M. Achitra, R. Ambika Rajashre, R. Vijayalakshmi Pandit, V. Saranya, (2018)

In this literature review, the author studied about the use of cement, coarse aggregate, rubber, bitumen for road construction. The possible use of this material should be developed for construction of low volume roads in different parts of our country. The solid waste can be used in different layers of the road pavement. Optimum content of waste rubber tyres to be used is between the ranges of 5% to 20%. Problem like thermal cracking and permanent deformation of pavement are reduce in hot temperature region. Sound absorption property of Rubber helps in reducing the sound pollution of heavy traffic roads. Waste rubber tires thus can be put to use and it ultimately improves the quality and performance of road. Conventional aggregate can be saved to the certain quantities by replacing the rubber in bitumen and the strength will be increased.

(4) Dinesh S., Dinesh A., Kirubakaran K., (2016)

In this literature review, the author has used waste plastic, river sand, red oxide (ferric oxide). The three blocks of fly ash bricks, burnt bricks and plastic sand paver blocks were cast with different proportion for testing. Tests like compressive test, water absorption test, efflorescence test, fire resistance test, hardness test were performed. The results were obtained that the plastic sand bricks possess more advantages which include cost efficiency, removal of waste products, gives more strength, low water absorption capacity, low alkali content.

(5) LairenlakpamBillygraham, Singh, (March 2017)

In this literature, the author has used waste compact disc (CD) and waste water bottles and River sand. Two specimens of bricks were made, one with sand and waste CD's, another with sand and waste bottles are produced

and tested for physical and mechanical properties. The sand plastic bricks are light weight and present a waxy surface. The result of sand plastic bricks are compared with traditional local bricks. It is observed that sand plastic bricks have low water absorption, low apparent porosity and high compression strength than normal clay bricks.

(6) R. Vasudevan, A. Ramalinga Chandra Sekar, B. Sundarakannar, R. Velkannadi, (2012)

In this literature review, the author has used materials like waste plastics both by domestic and industrial sectors was found to be a source of raw material for the flexible pavement. Waste plastics, mainly used for packing are made up of PE, PP and PS. There softening point varies between 110^0 and 140^0. Different waste plastics are used for coating over the aggregate. The Characteristics of waste plastic like thermal characteristics and Physical characteristics were tested. In dry process, the aggregate is modified by coating with polymers and producing a new modified raw material for flexible pavement.By using higher percentage of plastic waste, reduce the need of bitumen by around 10%, increase the strength and performance of the road.

(7) Mageshwaram, Satish kumar, vijaykumar, Praveen kumar, (2018)

The present literature is based on utilization of waste plastic with sand in addition with naylongride in paver stone different material like waste plastic, m-sand, naylon grid are use. Water absortion, compression test, fire resistance test, hardness test are conducted on paver stone. By adopting precast paver block made using plastic waste, m-sand and nylon grid have shown better result and benefits result of all test are compare with paver stone

(8) Afroz Sultana, SK, SKB. Prasad, (2012)

In this paper the author worked on used of waste plastic as a strength modifier in surface course of flexible and rigid pavement. Author used fine aggregate, bitumen, polymer, cement and water. Specific gravity, water absorption, strength, initial setting time, final setting time, softening point, penetration, ductility test were conducted.By using plastic as a coating over aggregates, the properties of aggregate are improved.By adding plastic to the unmodified bitumen. There is increase in the softening point and decrease in penetration and ductility value.

(9) Sarang Shashikant Pawar, Shubhankar Anant Bujone, (2017)

In this paper author worked on the use of fly ash and waste plastic paver block. If we use this type of plastic in our construction purpose it will help to requisite of waste material. As the plastic has longer life we can use it paver block. They replace plastic with crushed aggregate in 10% 20% 30%. From results they concluded that use of plastic can be possible to improve properties of paver block. As per there result strength was increased upto 30-35%

(10) Dr. Muhammad Maqbool Sadiq, Muhammad Rafique khattak, (2015)

In this paper the author use different plastic waste material is concrete they have work on use of pulverized plastic in concrete as partial replacement of fine aggregate. The behavior of concrete is studied under various combination of plastic waste material with regard to effect of various concrete properties. Fine aggregate in mix proportion of concrete was replaced with plastic waste at 10% 20% 30% 40% and other concrete material remains same for all mixes. In the result by slump cone test they get the low workability. Flexural and compressive strength were tested at 28 days and reduction in both strength with increasing % of plastic.

3. MATERIALSUSED

3.1Plastic Waste:

Plastic waste used in a paver block was collected fr om the surrounding locality then with helpshedding machine crushed plastic is used. Low density polye thylene (LDPE) plastic is used, it includes plastic b ags. The plastic bags used is of about 50microns.

Fig no 2 :PlasticWaste

3.2 Sand:

Sand is a granular material composed of finely di vided rock and mineral particles. The properties o f sand were determined by conducting test as pe rIS:2386 The results indicate that the sand confo rms to zone II of IS:(9383-1970).

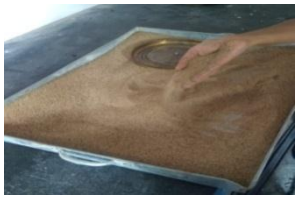

Fig no 3 :Sand.

3.3 Coarse aggregate:

Locally available coarse aggregates were used in this work. Aggregate passing through 6.36mm and retained on 4.13mm sieve were used.

Fig no 4: coarse aggregate

3.4 Fine aggregate:

Fineaggregat shall be coarse hard, sharp, angular g rains. The fine aggregate should be passed from IS sieve 1.17mm size.Fine aggregate shall clean an d free from dust, dirt and organic matter. Fine ag gregates resultin from the natural disintegration o f rock and which has been deposited by streams or glacial. In this experimental work, we used nat ural sand of bhandara.

4. COMPARISION BETWEEN NORMAL PAVER BLOCK AND PLASTIC PAVER BLOCK

1) The major difference between plastic and normal paver block is replacement of cement due to which curing process is not required and can be used within two days of casting having same compressive strength.

2) The use of waste plastic underway of paver square has gainful method of removal of plastic waste which can't be gain in normal paver block

3) Compressive strength of plastic paver block is quite similar to normal paver block

4) Plastic paver block is cheap and economical as compare to normal paver block

5) plastic paver block is light weighted as compare to normal paver block

5. APPLICATIONS

1) The use of waste plastic underway of paver square has gainful method of removal of plastic waste.

2) It can be utilized in gardens, on foot way and cycle way and so on.

3) Being non water permeable, the danger of due, green growth and organism is nearly dispensed with.

4) it can be used in non-traffic and light traffic road

5) By using the plastics in paver block, reduces the weight by 15%.

6) It requires less an ideal opportunity to make.

6. CONCLUSIONS

In this experimental work, we came to the followi ng conclusion:-

1) It is observed that, the compressive strength of plastic paver block is increased with th e addition of plastic quantity.

2) It is observed that, the compressive str ength of plastic paver block is more when compared to the concrete paver block.

3) The plastic paver block have low water absorption property.

4) The cost of plastic paver block is less when compared to the concrete paver block.

5) Being non water absorbent, the risk of du e, algae and fungus is almost eliminated.

6) Plastic paver block does not require curin g.

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