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An Experimental investigation of Coarse Aggregate replace with Soft Plastic in Concrete for M30 Grade

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ABSTRACT: *Currently, the largest environmental issue facing our nation is solid waste management. Despite efforts to decrease its usage, plastic is being used more and more every day. These wastes create issues for the environment and human health. It produces an unhealthy amount of garbage every day. Recycling that is sustainable and healthful has several advantages. This project thought to be viewed as a starting point for more extensive investigation into the use of plastic aggregate in place of coarse particles in concrete. In order to identify the ideal percentage and ascertain the effectiveness of plastic aggregates, research was conducted in this work using varying percentages of plastic aggregates such as 0%, 2.5%, 5%, 7.5% and 10% and the optimum result and performance of plastic aggregate on concrete which is higher then the conventional concrete is 7.5%.*

KEY WARDS: *Placsic Aggragate, Artifical Aggregate, Replacement*

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I. INTRODUCTION

Time series Most used materials in the construction is concrete. It have a four ingredients such as coarse aggregate, fine aggregate, cement andwater. Concrete might be cast in the desired shape by using moulds.Itsincluding strength, durability, easy handling and used for many purpose. This indicates that it is more durable and is not much impacted by chemicals. Plastic trash disposal is a major issue since, in the absence of organic substances, it is a non-biodegradable substance that poses a risk to human health and the environment. Because plastictakes a very long period to dispose and has more negative effects on the environment. As a result, we can use it in the concrete on the structure. Additionally, using plastic garbage that has undergone some processing can contribute to reducing environmental waste.

II. SCOPE

The majority of aggregates are produced by mining and crushing. Cracking releases dust particles into the environment, much like rock mining alters the local geology. As so, it harms the ecosystem in two different ways. Here we concentrated on waste products that also harm the environment. By reducing the amount of raw materials used to make concrete andemployingmaterials that have an affect on the environment. The regions of application and advantages that come with including plastic aggregate into the concrete mix are referred to as "coverage of manufactured plastic aggregates used in concrete."In the process of making concrete, plastic aggregates, which are often created from recycled plastic components, can partially replace conventional aggregates like sand and gravel.

III. LITERATURE REVIEW

Prof. Elson John and Anumol S:-Now a days, a solid waste management facing a largest issue in the environment. In this environment the plastic is being used more everyday. This waste have negative efforts on the environment and human health. It produce lot of waste so it really unhealthy for environment. This project should be seen as a starting point for further research into the usage of plastic aggregate in place of coarse particles in concrete. In order to identify the ideal percentage of plastic aggregates in concrete, research was conducted in this work using varying percentages of plastic aggregates (10%, 15% and 20%). The possibility of

concrete using plastic stone as a building material is evaluated, as well as its mechanical and durability properties.Furthermore, the concrete mixture having plastic particles were investigated and compared to a reference mixutre.

Prof. Saurav Yadav and Parwez Alam:-Construction is at its peak globally right now, in the world's fastest-growing country, and concrete is a common element in the construction.Plastic waste is also one of the most serious environmental issues in today's society.The purpose of this research is to develop a strategy to reduce the worldwide environmental emergency by using construction materials rather than plastic waste. The review that application of plastic in layer and fine aggregate alternation, how it affects workability, tensile strength and other tests. Afte 7 and 28 days the result of the concrete sample (150 mm x 150 mm x 150 mm) wee contrasted with traditional cube mixed with no plastic waste.A sustainable development approach for ecological construction could include replacing natural aggregates with recycled plastic trash. The percentage of plastic in the concrete volume is 0% and 25%.

Prof. Elango A and Ashok Kumar A:-A concrete with plastic fine aggregate in 2018. OPC 53 grade,sand and crushed aggregate wereused. The proportion of 10%, 20% and 30% were used replace plastic of fine aggregate. Properties of mechanical and durability were tested on their samples andfound decrease in the strength of concrete. But they found good result in the acid attacks and elasticity. In the place need less compressive strength but more durability can we use plastic aggregate concrete.

Prof. Lakpa Wangmo Thigh Tamang Et. al.Used Plastic in replace of coarse aggregate is performed in 2017. They tested properties of the mechanical in concrete that contained plastic aggregates. 10%, 15% and 20% are proportion are use in plastic aggregate. They found decreasce in strength and the final result as 15% replacement.

Prof. MB Hossain et. al.Waste plastic in concrete as constituent materials in 2016. 5%, 10% and 20.5% are replace in coarse aggregate. The weight of the concrete is lighter. The compressive strength was lower than conventional concrete. The 10% of plastic aggregate shows strength similar to the conventional concrete.

IV. OBJECTIVES

The goal is to discover if plastic aggregate may be used as a coarse aggregate in concrete, as well as to minimize the amount of plastic waste disposed of and the removal of natural aggregates.
. Further objectives are given below:

- To obtain an optimum percentage of aggregate replacement.
- To observe failure of section in the form of fractures.
- To calculate flexure strength of sections.
- To analyse the M30 mixed proportions.
- Identify the compressive strength of plastic mixed concrete blocks.

V. EXPERIMENTAL INVESTIGATION

5.1Cement

Use ordinary Portland cement to ascertain the properties. Cement's characteristics were investigated through laboratory studies.

5.2 Fine Aggregate

For the experiments, M sand that was readily available in the area was run through a 4.75 mm IS sieve. According to IS383-2016, laboratory tests were carried out to ascertain several physical qualities. The grading zone is I and the fine aggregate has a specific gravity of 2.6.

5.3 Coarse Aggregate

A mix of 20 mm aggregates is utilized to provide correct gradation. The various physical parameters according to IS383-2016 were determined through laboratory testing. It has a coarse aggregate specific gravity of 2.8.

5.4 Plastic Aggregates

plastic aggregates are made from waste plastic, that are collected from the Waste dump,that are melted and torn into predetermined size by torn machines. There has 2.1 specific gravity.

5.5 Mix proportion

Table.1Percentage of Replacement of NCA by PCA

S.No	Concrete Name	Natural Coarse Aggregates (NCA)%	Plastic Coarse Aggregates (PCA)%
1	M1	100	0
2	M2	97.5	2.5
3	M3	95	5
4	M4	92.5	7.5

VI. EXPERIMENTIAL PROCEDURE

6.1 Design of concrete mix:

The process of selecting and calculating the various components of concrete, as well as considering the material's cost and other characteristics including workability, slump value, and strength requirements, is known as the concrete mix. We designed the concrete mix in accordance with IS:10262-2019. Trial mixes were made in order to verify the mix design and make necessary adjustments to the water cement ratio and additive content. The mix design was conducted using the subsequent parameters:

Concrete Grade : M30

Type of Cement	: OPC - 53 Grade
Cement Manufacturer	:Dalmia
Zone of Fine Aggregates	: Zone II
Specific Gravity of Cement	: 3.16
Specific Gravity of Fine Aggregate	: 2.65
Specific Gravity of Course Aggregates of 20mm	: 2.75
Water-Cement ratio	: For M30 w/c ratio is 0.4.

Unit of Batch	Grades	Cement (kg)	FA (kg)	CA (kg)	Water (Lit)	Chemical admixture (Super plasticizer) (kg)
1 Cubic Meter content	M30	372.4	701.1	1234.2	167.6	3.72
Ratio	M30	1	1.88	3.31	0.45	0.05

6.2 Specimens for Compressive Strength

In order to assess the concrete mixture's compressive strength, cube-shaped specimens measuring 150 x 150 x 150 mm were made. Weighing the necessary quantities of material, we took into account the mixing ratio. First, cement and aggregates were well combined. The dry mixture was then mixed with water. Nine cubes in all, three of each type, were tossed during the 7 and 28 day tests. Following a 24-hour casting period, the cubes were taken out of from the mould and put in a curing tank.

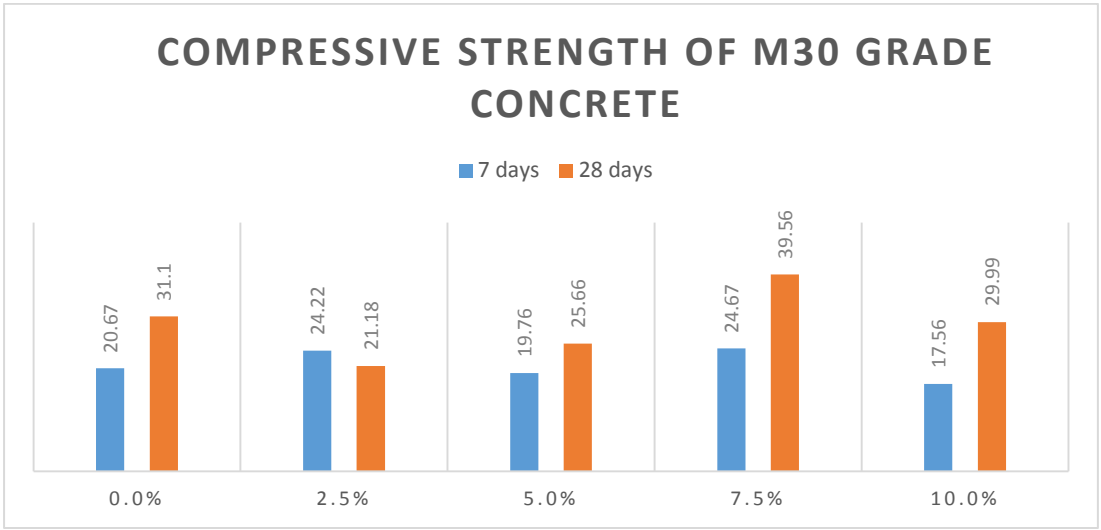

Figure1: *Compressive Strength*

6.3 Specimens for Flexure Strength

The flexural strength of the concrete mixture, beam specimens of 100 mm by 100 mm by 500 mm were created. Weighing the necessary quantities of material, we took into account the mixing ratio. First, cement and aggregates were well combined. The dry mixture was then mixed with water. Three identical bars total 3 bars per testing periodwere cast over the 7 and 28days periods. Following a 24-hour casting process, the beams were taken out of the mould and put into a solidification tank.

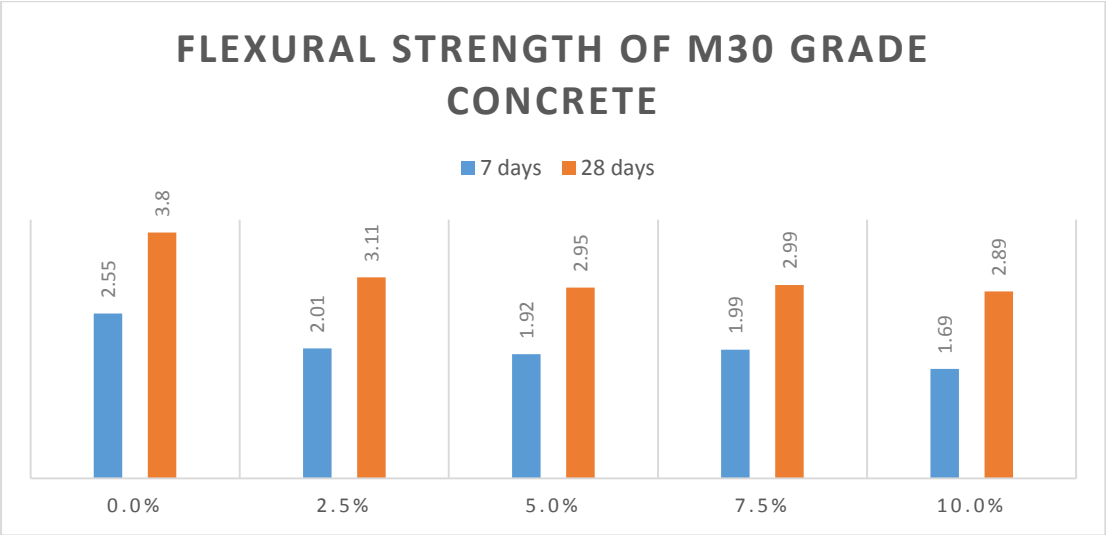

Figure2: Flexure Strength

6.4 Specimens spilt tensile strength

The 150 x 300 mm cylindrical specimens were made in order to test the cylindrical mixture's cracked tensile strength. Weighing the necessary quantities of material, we took into account the mixing ratio. First, cement and aggregates were well combined. The dry mixture was then mixed with water. Three identical cylinders in total, one cylinder for testing for 7 and 28 days. Following a 24-hour casting period, the cylinders were taken out of from the mould and put in a curing tank.

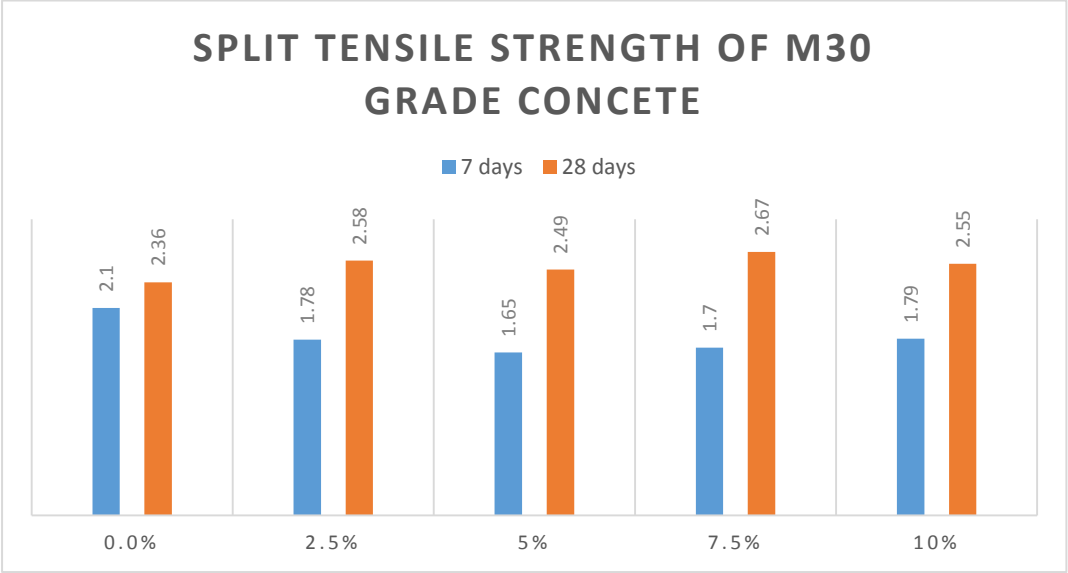

Figure3: Spilt Tensile Strength

VII. CONCLUSION

When more plastic aggregate is added, the strength properties of plastic concrete mixers typically deteriorate. This can be the result of the adhesive force among the cement paste and plastic material surfaces becoming weaker. Plastic is also a hydrophobic substance that doesn't take part in hydration. As the primary natural resources in our planet are being depleted, we must turn to plastic or recycled aggregate as our next best option. By studying plastic waste, we hope to be able to offer a more favorable option for both society and the environment. Plastic aggregate has been added to the concrete at percentages of0%,2.5%,5%, 7.5% and 10% in replace of coarse particles. In this study finds marginal reduction in strength of the concrete specimen and recommended that the optimum result as 7.5% replacement.

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