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Utilization of Horse Dung Waste as a Replacement of Fine Aggregate in Concrete Mix

Vijeyata Nag[1], Rajesh Joshi[2]
P.G. Scholar[1], Asst. Prof. [2]
Department of Civil Engineering, R.G.P.M., Bhopal, Madhya Pradesh, India

ABSTRACT

As per the presentation endeavors', this examination concentrates on the waste deposition of horse (horse dung) as a partial replacement for fine aggregate as a fiber in design mix concrete. The counter active action of ecological contamination with considering the components of reasonable and cost-sparing development ventures, particularly material utilization.

In our work, total 30 cubes and 10 beams were cast with five different proportions. Horse dung waste as partial replacement of fine aggregates with the percentage of 0%, 10%, 20%, 30% and 40% for M-25 grade of concrete. Besides this, all other parameters are constant.

The concrete cube and beams were tested as destructive test at last which is compressive test, that to find out compressive strength and flexural strength of specimens of hardened concrete at 7 and 28 days. From the results of the study, samples of the concrete with 0 to 40% horse dung waste as an fine aggregate replacement have reached optimum strength. Finding Showed that concrete 0 to 30% showed the higher amount of compressive strength, flexural strength of concrete and decrement at 40% contain horse dung.

Keywords : Horse Dung, Concrete, Fine Aggregate, Compressive Strength, Tensile Strength, Cement.

I. INTRODUCTION

Concrete is a most versatile construction material since it is intended to withstand the hazardous situations, with satisfactory strength and durability. Due to overutilization of the concrete, material winds up plainly frightened, and furthermore, the generation at bigger rate make numerous perilous to the earth. On opposite side, the waste presented to our condition is an effect to biological cycle, among all mechanical waste, is the significant wellspring of waste which will influence the earth.

Cement and aggregate, which are the most basic constituents used in concrete production, are the basic materials required for the construction industry. This certainly incited a constant and extending enthusiasm of natural materials used for their production. Parallel to the necessity for the utilization of the natural resources builds up a creating stress for guaranteeing the earth and a need to spare natural resources, for such as aggregate, by using elective materials that are either reused or discarded as a waste.

Most of the construction and demolition waste in our country are not recycle but end up in landfills occupying valuable land not to mention the cost incurred in land filling. However, many of the construction industry in India produce construction waste that contributes largely to solid waste. In general, the solid waste material is a result of the construction waste material or residual results from the renovation of the building such as stone, wood,

iron, cement and other waste materials. This research will focus on ceramic wastes obtained from the industry in India. Presently in the ceramic industry, the production goes to waste, which is not undergoing the recycle process yet. Conventionally, the coarse aggregate used in concrete productions are gravel, crushed stone, granite, and limestone.

Extensive steps have been taken out universally to employ local natural waste as accompanying cementing material to improve the properties of cement as well as use of these material leads to the suitable disposal of natural waste consequence to less impact on surroundings in order to reduce the loss due to improper disposal of the waste. Usually a high strength concrete is prepared by evaluating artificial fiber or polymer which results in increment of cost. By habituation of natural fibres or fibres from waste in concrete mix, an effort was made to amend the physical properties of concrete. High strength concrete is typically recognized as concrete with a 28 days compressive strength greater than 35 MPa as per IS code. By finding optimum mix design with regards to the amount of water-cement ratio fiber and aggregates, the high strength concrete was prepared by using waste in beneficial manner. Natural organic fiber from waste (horse manure) is used as admixture in concrete. The physical composition of horse dung consists of straw, straw pellets, straw flax, flax, wood pellets, saw dust. The chemical composition of the excreta is 24.63% crude fiber, 32.84% dry matter, 81.83% volatile organic matter, 18.17% ash and 2.95% ether extract. The regular fiber length of the manure is 10-15 mm. The fiber has a diameter of 0.1-0.3 mm. About 5.56 Megatons of manure is produced annually in India. There is a need of investigating the behavior of horse manure for different grades of concrete as a fibrous reinforced material for concrete and analyzing properties of fresh as well as hardened concrete.

Fig 1: Horse dung

II. Literature Review

ShaikAkhilMastan. et. al. (2017) has examined out that experimental investigation on partial replacement of cement with fly ash and fine aggregate with foundry sand. The principle point of this exploration is to ponder the use of waste ceramic tiles as a fractional replacement of coarse aggregate (20mm) and 10% fly fiery remains as a supplanted of cement in concrete. For every one of the materials physical properties might be done and mechanical properties, for example, compressive strength and split elasticity of concrete were inspected and contrasted and typical concrete. M30 review of concrete was intended to set up the customary blend. The 3D shapes and chambers are resolved at 7 years old and 28 days. Solid shapes for compressive strength as size 15X15X15 cm and chamber for split rigidity as size 15X30 cm were thrown by receiving weight bunching and hand blending. The blend was assigned with different level of waste ceramic tiles, for example, 0%,10%,20%,30%,40% and half to assess different properties. The outcome which turns out from the examination work demonstrates that the strength created in concrete is expanded, it can be likened to higher strength concrete and it can be effortlessly utilized as development material in development work.

M. Sekar (2017) has examined that partial replacement of coarse aggregate by waste ceramic tile in concrete. In this investigation, an endeavor has

been made to discover the appropriateness of ceramic coarse aggregate as a conceivable substitute for customary aggregate in concrete. The concrete examples were thrown with blend 1:1.65:2.82 and 1:1.56:2.82. Ceramic waste aggregate 15%, 30%, 45% incomplete replacement, the strength of concrete. The tests were done following 7days and 28 days of the throwing concrete example. The ceramic industry is known to create a lot of calcined-earth wastes every year. So far a colossal part is utilized as a part of landfills. Reusing these losses in concrete could be an inside circumstance. So we lean toward ceramic waste to expand the strength and soundness of concrete.

III. Objectives

- To study the strength developments hardened concrete with waste (horse dung) replacing fine aggregate.
- To replace the fine aggregates with various percentage 0%, 10%, 20%, 30% & 40% of horse dung waste in M25 concrete.
- To determine the effect of various percentage of horse dung waste as partial fine aggregates replacement towards compressive, split tensile, flexural strength of concrete.
- To determine the water absorption of (horse dung) aggregate concrete containing various content of horse dung as partial coarse aggregates replacement material.
- To study the effect of compressive, split tensile, flexural strength characteristic properties of waste in concrete.
- To establish a comparative study between aggregate 10 mm and horse dung replacing aggregate 10 mm.

IV. Scope of the study

The environmental waste contains many inorganic and toxic substances beyond the acceptable limit cause impact to living life. To overcome these issues these waste can be recycled and reused for any useful purpose with acceptance levels.

Horse dung waste contains fiber particals like straw, wheat etc which is disposed to landfill create pollution at larger rate. In this project work, horse dung are collected and processed for partial replacement with fine aggregate. These replacements will reduce the cost of the project at greater percentage because aggregates are more costly than cement for concrete production.

There are numerous request and concentrate that had done convey to ad lib the nature of concrete generation and to make different sorts of concrete that will be utilized for various purposes as indicated by its reasonableness. Many explore had been led to heightening the quality or properties of the customary concrete by blending or including different materials into the normal ordinary concrete. For this examination, horse dung waste is utilized as halfway fine aggregates replacement to regular fine aggregates.

The investigation is basic in light of the fact that the proposed material to supplement fine aggregates is a waste item from development. On the off chance that ceramic waste is reasonable, it can be utilized as a part of a concrete generation. This will decrease the waste material from development as ceramic tile waste can be reused for concrete creation purposes. Moreover, we can chop down the employment of normal aggregates that are created from quarrying process which is an on-natural process and destructive to the condition. The concrete generation cost can be diminished in light of the fact that the option material is waste material that is low in cost.

V. Methodology

In the previous chapter, we have discussed the various works done by authors down the history. This chapter deals with the Mix design procedure adopted for Control concrete and the procedure and various steps carried out for the manufacturing of concrete.

1. To prepare of M25 concrete grade and obtain its fresh and hardened properties.
2. To prepare horse dung waste aggregate of M25 grade study their fresh and hardened properties.
3. To analyze the different type of load behavior of M-25 concrete.

VI. Experimental Setup

- To build a structure first we need to build its base or foundations. Likewise, first of Mix design for M25, grade of concrete is prepared according to the Indian standards code" IS 10262:2009.
- In the preparation of mix design for M25, grade of concrete various physical properties of the materials like specific gravity, nominal size, water absorption capacity, fineness Modulus etc. are required, also some other conditions like type of exposure to sun and water, material mixing technique etc. are to be assumed in accordance with Indian standard code IS 456:2000.
- After working out the quality of different materials in an appropriate proportion, it's time for the selection of materials.
- Keeping in mind the "Indian standards" materials are selected i.e., aggregates:-
- Conforming/full filling the various conditions as per IS 383:1970 and cement 53 grade OPC conforming to IS 12269:1987 are taken.
- Selected materials are mixed in a fixed proportion as per mix design to acquire the desired strength. Sampling & analysis of concrete is done according to IS 1199:1959.
- IS 2386 (Part 1): 1963 is used for the methods of tests for aggregates for concrete
- Specifically for shape and size of aggregates.
- Two important tests are performed on concrete namely
- Slump cone test
- Compaction factor test, after preparation of mix for physical properties of concrete.
- Standard moulds of size 150 mm x 150 mm x 150 mm are then cleaned and oiled.
- Concrete is poured into the moulds and differently shaped reinforcements are placed in the Moulds.
- After 24 hrs. Concrete cubes are unbolted from moulds and named with water resistant paint and placed in the curing tank filled with normal water at 27 ± 2 0C for 28 days.
- At the end of 7, and 28 days curing it's time for the final test which gives the actual strength of concrete i.e., compression strength test in accordance with the "Indian Standards code" IS 516:1959 for the test of concrete.

Table 1: Aggregate replacement

Percentage of weight replacement	10mm	Waste aggregate	
0%	27.31	0	As per .0551m3 (for casting seven cubes and two beams)
10%	24.597	2.731	
20%	21.848	5.462	
30%	19.117	8.193	
40%	16.386	10.924	

VII. Experimental Results

Table 2: Compressive strength of cube:

Days/% of replacement	0%	10%	20%	30 %	40%	Remark
7 day	25.912	25.825	25.038	23.94	22.557	Average.
28 days	32.8	32.7	32.1	31.5	30.9	

Table 3: Flexure strength of concrete

Flexure Strength in Div. contain horse dung waste aggregate					
Day's	**0**	**10**	**20**	**30**	**40**
28	2.92	2.90	2.84	2.79	2.71

VIII. CONCLUSION

- In this exploratory examination, we have used horse dung manure as incomplete substitution of fine aggregate as an option material of concrete for M25 review of concrete and from different tests on concrete cubes and beam. we have closed after outcomes.
- The fundamental point is to find the water content required to make a concrete paste of standard consistency as dictated by the IS Code. According to the rules, the standard consistency of concrete is appropriate at which the Vicat plunger enters to a point 5-7mm from the base of Vicat shape. The consistency of the bond in this examination was seen to be %.
- Slump exhibits that the workability decrements with the extension in the rates of containing artistic waste horse dung aggregate with the percentage of 10% to 40%.All investigated containing fired waste pulverized tile aggregate mixes had stature slump regards and commendable workability at M25 grade of concrete.
- The result of CTM of M25 grade of a concrete cube having waste horse dung aggregate s partial replacement of fine aggregate with the percentage of 0%,10%, 20%, 30% and 40% with the age of 7, and 28 days for concrete cubes and 28 days for beam.
- We can see that the flexure quality in M25 audit of concrete at 28 days, flexural quality are higher than when level of usage of 10%, 20%, 30% and lower level at 40% of the terminated waste horse dung aggregate with the supplanting of fine aggregate increases with the age of 28 days.
- We observed that gradient of 10 mm aggregate sample with horse dung sample shows that our experimental results are in its specific limits as per I.S. code.

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