JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

PARTIAL REPLACEMENT OF INGREDIENTS IN CONCRETE WITH DEMOLITION WASTE MATERIALS

M.S.Phani kumar,[1] K.NagaMalleswararao[2], M.Pavankumar[3], N.Sarathkumar[4], P.VenkataKiran[5], T.Nagasai[6], U.Sai[7]

Assistant Professor [1],UG Student [2], UG Student [3], UG Student[4], UG Student[5], UG Student[6] UG Student[7]
Civil Engineering ,
NRI Institute Of Technology , Vijayawada ,India

Abstract: This experimental study is aimed to create a concrete mixer consisting which replaces the fine aggregate and coarse aggregate with demolition Waste. It is also used to analyze the effect of demolition concrete in terms of Workability addition of aggregates etc. after preparing the concrete block, the differences in weight between the original concrete and the demolition concrete block is also tested. The Demolition waste is mixed in definite proportions with the concrete. And then various tests are conducted for fresher concrete as well as hardened concrete. The Demolition waste in various percentage (10%,20%) for M25 mix to determine the compressive strength, flexural strength splitting tensile strength were determine and compression made with control concrete and durability of concrete and are compared for both grades and results are tabulated and the optimum percentages are concluded.

Index Terms **–Demolition waste, Workability, Flexural strength, Compressive strength**

I. INTRODUCTION

Demolition wastes are heterogeneous mixtures of building materials such as aggregate, concrete, wood, paper, metal, insulation, and glass that are usually contaminated with paints, fasteners, adhesives, wall coverings, insulation, and dirt. These types of wastes are generated from the complete or selective removal/demolishing of existing structures either by manmade processes or by natural disasters such as earthquakes, floods, hurricanes, etc. (Al-Ansary et al., 2004b), in addition to wastes generated from the renovation and remodeling works.The composition and quantities of demolition wastes depend on the type of structure being demolished, the types of building materials used, and the age of structure being demolished. The most common types of wastes generated from demolition activities are wood, rubble, aggregates, ceramics, metals, and paper products. Although, there is no typical percentage of each waste stream generated from demolition activities, the quantity of demolition wastes from residential buildings is estimated to be 1.3 to 1.6 ton/m2 of the ground floor area of the structure. The quantity of demolition wastes resulting from industrial structures is estimated to be from 1.5 to 2.0 ton/m2 of the total demolished area (Al-Masha'an and Mahrous, 1999). In general, the demolition wastes are estimated to be from 1.0 to 2.0 ton/m2 of the total ground level area.There are many advantages for managing demolition wastes, such as reducing air borne pollutants generated from the unloading activities of waste, decreasing the possibility of heavy metals and hazardous material within the waste stream that could possibly contaminate both soil and underground water, improving the health and safety conditions by controlling the hazardous materials, broken and sharp objects and leachates from biodegradable wastes within the waste stream, and minimizing visual pollution that negatively affects the socio-economic development in any community.Various endeavors have been attempted to manage the wastes generated from demolition activities. For example, grinding of demolition wastes has been attempted to reduce the total waste volume while the resulting powdered wastes could be landfilled (DiChristina and Henkenius, 1999). However, preventing the generation of demolition wastes is a more effective technique than managing the wastes

Use Of Demolition Waste :-

The use of different waste in the concrete mix or for obtaining new types of concretes had as result the development of a new type of construction materials: green materials. In this category is included inorganic polymer concrete which is obtained predominantly from industrial waste materials. Concrete of any type had been used as it is or in combination with other materials, the most known being the steel with which had resulted reinforced concrete and prestressed concrete, that are still today very common and useful in construction industry. A high variety of waste are used for obtaining concretes of different requirements related to strength, to chemical resistance, with high durability, rapid hardening, etc.

An important way to use the wastes is to introduce them as a powder or filler in the composition of construction materials (cement, concrete, asphalt, etc.) or to use as aggregates (concrete or bricks from demolition can be used as an aggregate, steel slag can be transformed into aggregates, etc.). Concrete is one type of building material that can incorporate many types of

waste such as silica fume, fly ash, cinder, husk, tires, glass, etc. Concrete is used for obtaining structural elements and constructions of any type.

OBJECTIVES OF THE PROJECT:-

- In This study the main concern is to find an alternative for coarse aggregate and fine aggregate. Substitution of Coarse aggregate and fine aggregate by Demolition waste will reduced the environmental problem of solid waste.
- The study focuses to determine the relative performance of concrete by using Demolition waste. Concrete of Demolition waste gained more strength than concrete with normal cement concrete.
- The utility of demolition waste as partially replacement in concrete mixed is on rise these days. Demolition waste is locally available in Waste Materials.

EXPERIMENTAL PROGRAMME:

Cement: In this work, ordinary Portland cement of Birla (53 grade) brand obtained from a single batches trough Out the investigation was used. The ordinary cement Content mainly has two basic ingredients namely, Argillaceous and calcareous. The physical properties of OPC as determined are in Table 2 & 3 . The cement satisfies The requirement of IS: 8112-1989

Table-1: Chemical Requirements of OPC 53 Grade concrete

S.NO	CHARACTERISTICS	REQUIREMENTS
1	Ratio % of lime to silica ,alumina and iron oxide	0.80-1.02
2	Ratio of % of alumina to iron oxide,min	0.66
3	Insoluble residue content % by mass,max	4.0
4	Magnesia content % by mass,max	6.0
5	Total sulphur content	3.5
6	Loss on ignition % by mass,max	4.0
7	Chloride content % by mass,max	0.1
8	Alkali	0.005

Table-2: Physical Properties Coarse Aggregates

S.NO	PARTICULARS	COARSE AGGREGATES
1	Density	1830
2	Fineness modulus	7.53
3	Specific gravity	2.78
4	Water absorption	1.60
5	Surface moisture	NILL

Table-3: Chemical Properties of Coarse Aggregates

COMPOUND	OXIDES CONTENT(%)
SIO_2	55.57
AL_2O_3	0.77
Fe_2O_3	0.37
CaO	13.33
MgO	9.59
Na_2O	0.14
K_2O	0.09
TIO_2	0.01
P_2O_2	0.01
LOSS ON IGNITION	19.48

RESULTS AND DISCUSSIONS:

Table-4:Compressive strength test results

Mix	Compressive Strength (N/mm^2)		
	7 Days	14 Days	28 Days
C_1 - 0 %	18.93	26.22	28.84
C_2 - 10 %	19.25	26.66	29.3
C_3 - 20 %	22.2	30.667	33.73
C_4 - 30 %	20.22	28	30.8

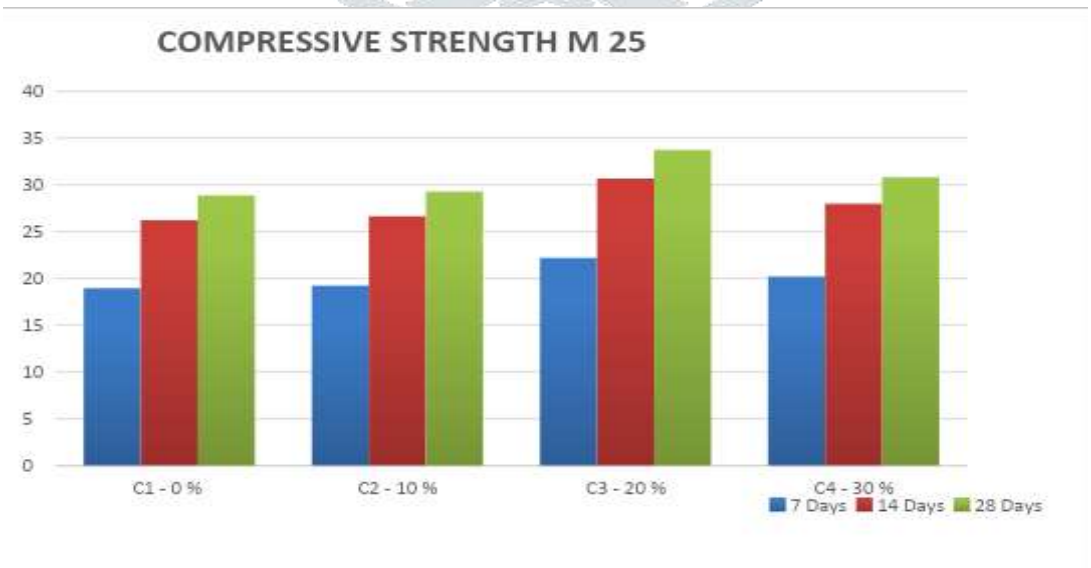

Fig-1.0: Variation of compressive strength

Table-5: Split tensile strength

Mix	Spilt Tensile Strength (N/mm^2)		
	7 Days	14 Days	28 Days
C_1 - 0 %	1.4	1.89	2.2
C_2 - 10 %	1.43	1.98	2.17
C_3 - 20 %	1.90	2.6	2.94
C_4 - 30 %	1.8	2.5	2.75

Fig-2.0:Variation of Split Tensile strength

Table-6: Flexural Strength

Mix	Flexural Strength (N/mm^2)		
	7 Days	14 Days	28 Days
C_1 - 0 %	4.4	6.15	6.68
C_2 - 10 %	4.52	6.25	6.87
C_3 - 20 %	5.41	7.5	8.25
C_4 - 30 %	5.2	7.2	7.92

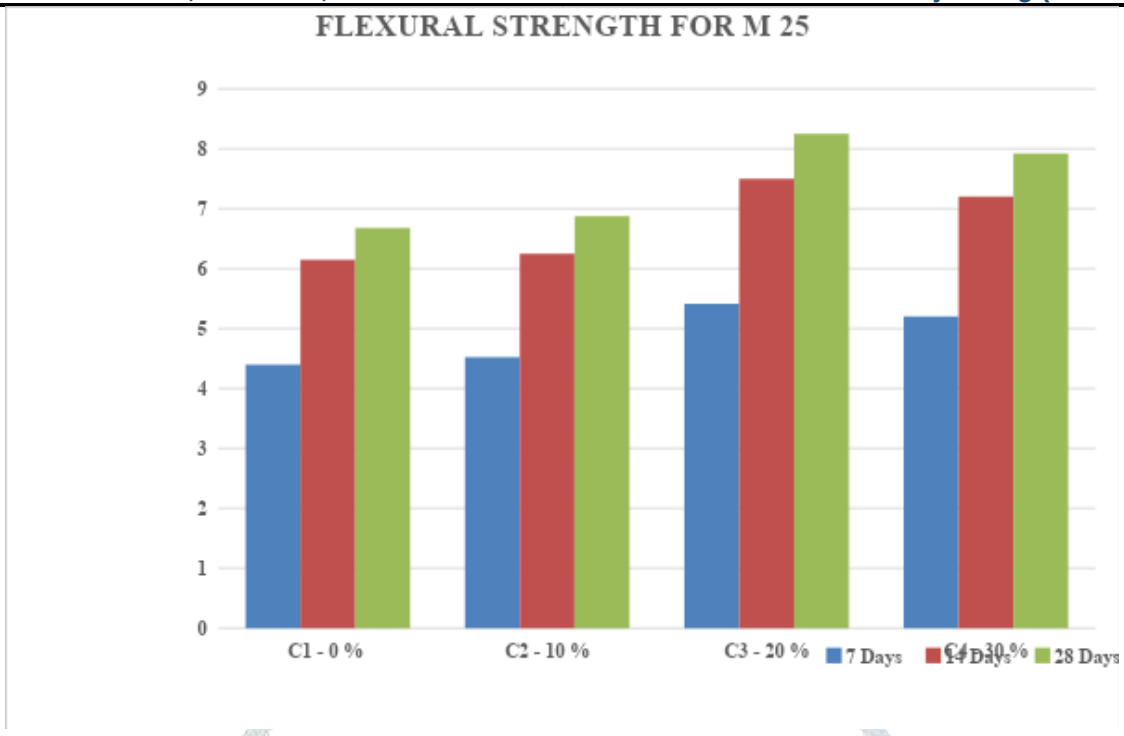

Fig-3: Flexural strength variation

CONCLUSIONS:

1. The replacement of fine aggregate and coarse aggregate with demolition waste can be strengths can be compared with normal concrete,
2. To Compare compressive strength and flexure strength and splitting tensile strength of partial replacement of fine aggregate and coarse aggregate with demolition waste with different percentage of partial replacement
3. The strengths can be compared to normal concrete can replacing of 10%of demolition waste can compressive strength and flexure strength and splitting tensile strength are nearly in normal concrete of m25 mix design
4. Nearly In same strengths of normal concrete can obtained in 10%partial replacement of fine aggregate and coarse aggregate with demolition waste concrete
5. The 20% replacement of fine aggregate and coarse aggregate with demolition waste with the can be better strength can obtain to compare the normal m25 mix design concrete
6. Then after 30%partial replacement of fine aggregate and coarse aggregate with demolition waste of concrete can gradually reduce the compressive strength, tensile strength and flexural strength.

REFERENCES:

1. Mohammed, Tarek Uddin et al. 2014. “Recycling of Brick Aggregate Concrete as Coarse Aggregate.” Journal of Materials in Civil Engineering B4014005(January): 1–9
2. Centre for Science and Environment, New Delhi, India. 2014. DEMOLITION WASTE
3. Achu R. Sekhar, Krishna Chandran, Vaibhav Rathi, Training Manual on Construction and Demolition Waste Management in India for Cities and Towns, (2017), New Delhi, India
4. Hegde, Ramakrishna et al. 2018. “A Study on Strength Characteristics of Concrete by Replacing Coarse Aggregate by Demolished Column Waste.” International Journal of Engineering Ressearch & Technology 7(6): 386-95
5. Mohd Monish, Vikas Srivastava, V.C. Agarwal, P.K. Mehta and Rakesh Kumar, (2013), Demolished waste as coarse aggregate in concrete, J. Acad. Indus. Res. Vol. 1(9) .
6. Monish, Mohd et al. 2013. “Demolished Waste as Coarse Aggregate in Concrete.” Jounal of Academia and Industrial Research 1(9): 540–42.
7. Pappu, A., M. Saxena, et al. (2007). “Solid Wastes Generation in India and their Recycling Potential in Building Materials.” Building and Environment 42: 2311-2320.
8. Soutsos, Marios N., Kangkang Tang, and Stephen G. Millard. 2011. “Concrete Building Blocks Made with Recycled Demolition Aggregate.” Construction and Building Materials
9. Kamala, R, and B Krishna Rao. 2012. “Reuse of Solid Waste from Building Demolition forThe Replacement of Natural Aggregates.” International Journal of Engineering and Advanced
10. Rodrigo Eduardo Córdoba, José da Costa Marques Neto, Cristine Diniz Santiago, Erica Pugliesi, Valdir Schalch (2017), Alternative construction and demolition (C&D) waste Characterization method proposal, Eng Sanit Ambient, vol.24, no. 1, 199-212
11. Vilas and Guilberto (2007). “Construction and Demolition Waste Management: Current Practices in Asia.” International Conference on Sustainable Solid Waste Management, Chennai, India.