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

Experimental Study on Construction and Demolition Waste for Reuse and Recycle

VIJAY CHHAGAN PAIKRAO[1], ATHARV LAXMIKANT DESHMUKH[2], ARBAZ ABULAZIZ QURESHI[3], PHADATARE VIDYATAI[4], SHRADDHA ASALAKAR[5]

[1 2 3 4] Dept. of Civil Engineering

[5] Asst. Professor , Dept. of civil Engineering1

[3]Dr. D.Y. Patil institute of Technology ,Pimpri, Pune, MH, India

Abstract : The management of construction waste is important today. The term waste has a distinct consequence from one person to the next. Waste is not needed for the person who throws it out, a product or substance that does not comprise a value to any further extent for the leading consumer and as a result thrown away. The scarcity in the availability of aggregate for the production of concrete is one of the important problems facing by the construction industry. Appropriate use of the construction waste is a solution to the fast degradation of raw materials in the construction industry. A large amount of concrete structures are demolished in India and other countries. But only small quantities of demolished waste are reused. This will have serious problems creating environmental pollution and also requires large amount of space for dumping the waste. Hence, our project aims at reuse of demolished concrete. In our project work, we have collected the Recycled Coarse aggregate from Construction and Demolition waste plant, Moshi. Construction of any concrete structures requires huge amount of natural coarse aggregate. So by using the Recycled aggregate, we can reduce the cost of purchasing natural coarse aggregate. Our project deals with replacing of Natural coarse aggregate by Recycled coarse aggregate in various proportions of 10%, 20%, 30%, 40%, 50% and 100%. Cubes and Cylinders were casted for different mix proportions and kept curing for 7 and 28 days. After the curing the cubes and cylinders were tested to find the compressive strength and split tensile strength of concrete. The results were discussed and conclusions were made accordingly.

***Key Words*:** Past, Approach, planning, town, method, legal future, development **.**

INTRODUCTION: -

Construction plays an important role in developing the infrastructure of the country. But the problem faced by the industry is the construction waste. Construction activities generate more waste compared to other industries. In construction process waste is generated at different stages. Like excessive cement mix processes or concrete materials left after work process is done due to change in design rework and demolition occurred and poor workmanship etc. And all the materials used in the construction activities gets wasted, which in turn increases the cost of the project, reduces the profitability and gives a negative impact to the environment. U.S. Environmental Protection Agency (EPA) defines construction and demolition (C&D) waste as waste materials consist of the debris generated during the construction, renovation, and demolition of buildings, roads, and bridges. C&D materials often contain materials that include: concrete, asphalt, wood, metals, gypsum, plastics and salvaged building components. Like other developing countries, India is also enjoying construction boom. With the rapid growth in construction activities of India it is appropriate to link the generation of C&D waste with the growth of construction industry and related issues. It is also essential to study C&D waste generation and handling to develop accurate data and establish sustainable methods to manage construction waste. Concrete is the most widely used construction material on this earth. In fact, concrete is used in virtually everything and there is still no substitute available for many of its applications. Without concrete, the community and society cannot exist. Therefore, lots of researches are going to find the new varieties of concrete which are economical for the construction. All these researches are focused on the replacements of different ingredients of the concrete which makes the concrete cheaper and even stronger too. A large amount of concrete structures are demolished in India and

other countries. But only small quantities of demolished waste are reused. This will have serious problems creating environmental pollution and also requires large amount of space for dumping the waste. Hence, our project aims at reuse of demolished concrete. Construction of any concrete structures requires huge amount of natural coarse aggregate. So by using Study of Construction and Demolition waste for reuse and recycle the demolition waste, we can reduce the cost of purchasing natural coarse aggregate. Our project deals with replacing of coarse aggregate by demolished column waste in various proportions of 10%, 20%, 30% and 40%.

AIM AND OBJECTIVE OF PROJECT

The construction and demolition waste management is one of the vast aspects of the construction industry. The main aim of this project is to reduce the construction and demolition waste generated by reusing and recycling the construction and demolition waste our approach is to fulfill the increasing demand of the resources by providing the recycled materials and to minimize the earth pollution. The main objectives the project is as follows

- To study demolition waste management policies.
- To study the C and D waste generation, its sources and streams.
- To understand the recycling of C and D waste for reutilization.
- To study the feasibility of C & D waste in terms of reuse, recycle and disposal.

LITERATURE REVIEW: -

In this chapter it was essential and important to make the review of literature of several authors regarding CDW and the use of RA. Further this chapter gives a discussion of various aspects like recycling plant and equipment used during the process, quality criteria of the produced product, standards and specifications used for several test methods and later some observations related to properties of produced RA are being described in further work.

- Title: Economic aspects of waste minimization of construction waste materials in terms of cost savings of construction projects of India
  Author: Mansi Jain
  Mansi Jain slated that due to lack of site waste management systems, lack awareness of waste minimization in Indian construction industry cause of generation of large quantities of material waste.
  This affect not only at environmental but also in terms of economically as waste materials handling cost. And found various causes for the waste generation like lack of awareness among owners and contractors, lack knowledge of labor, lack of proper training and education towards waste minimization system.
- Title: Recycled Aggregates: A Sustainable Solution of Construction and Demolished Waste
  Author: Sumit Arora
  - Sumit Arora et al. (2015) slated that natural resources are limited in nature and will be depleted with time.
  - In order to conserve the natural resources, unnecessary wasting of natural resources should be restricted and regulated.
  - Formulation and implementation of proper waste management plan throughout the life cycle of the projects can minimize C&D waste.
- Title: "Experimental investigation on concrete with partial replacement of coarse aggregate"
  Author: G. Murali
  - The study on effects of shahabad (a variety of cudappah) stone and the chemical admixture (supaflo) on concrete were investigated. Natural aggregate had been replaced with the waste shahabad stone in four different percentages namely 10, 20, 30 & 40 %.
  - A comparison was made between the specimens of partially replaced coarse aggregate and the same set of specimens admixed with supaflo.
  - The effects on compressive strength, split tensile strength and modulus of rupture were reported. Test results indicated that the replacement of coarse aggregate by 30% had attained a good strength.
- Title: "Experimental investigations of coarse aggregate recycled concrete" Author: D. V. Prasada Rao

- The present work is directed towards the evaluation of concrete using full replacement of natural coarse aggregate (NCA) with RCA. The experimental results of mechanical and durability properties are also evaluated.

METHODOLOGY:-

To determine the compressive strength of concrete by crushing.

Apparatus and Materials: Standard cube moulds (15cm x 15cm x 15 cm), tamping rod, trowel, weighing balance, compression testing machine, cement, coarse & fine aggregates, water etc. **Procedure:**

1) Select suitable proportion of cement, fine aggregates and coarse aggregates as per design and mix in dry state.
2) Add water in given proportion and mix them thoroughly.
3) Clean the mould and apply oil to the mould, fill the concrete and vibrate it on vibration table.
4) Remove mould from vibrating table keep them for 24 hours under wet jute and then cure the cubes under water.
5) At the ends of 7 days take out 3 cubes. Apply load gradually until failure. Note the load and type of failure. 6) At the end of 28 days test three cubes in the same manner and note the load & types of failure.

Concrete Mix Design
Grade designation = M20
Type of cement = OPC43 grade conforming to IS8112
Maximum nominal size of aggregate = 20mm
Workability= 75 mm (slump)
Water-cement ratio = 0.45
Below given are the mix proportions used in this project for M20 grade concrete:

1)Mix proportion for normal concrete Cement = 427.93kg/m3 Fine aggregate (sand) =636.15 kg/m3 Coarse aggregate = 1159.04 kg/m3 Water = 191.58 lit/m3 Water cement ratio = 0.45

2) Mix proportion for replacement of 10% coarse aggregate by demolished M20 grade concrete Cement = 427.93 kg/m3 Fine aggregate = 636.15 kg/m3 Coarse aggregate = 1043.14 kg/m3 Recycled coarse aggregate = 115.9 kg/m3 Water = 191.58 lit/m3 Water cement ratio = 0.45 3) Mix proportion for replacement of 20% coarse aggregate by demolished M20 grade concrete Cement = 427.93 kg/m3 Fine aggregate = 636.15 kg/m3 Coarse aggregate = 927.23 kg/m3 Recycled coarse aggregate = 231.81 kg/m3 Water = 191.58 lit/m3 Water cement ratio = 0.45

4) Mix proportion for replacement of 30% coarse aggregate by demolished M20 grade concrete Cement = 427.93 kg/m3 Fine aggregate = 636.15 kg/m3 Coarse aggregate = 811.328 kg/m3 Recycled coarse aggregate = 347.712 kg/m3 Water = 191.58 lit/m3 Water cement ratio = 0.45

5) Mix proportion for replacement of 40% coarse aggregate by demolished M20 grade concrete Cement = 427.93 kg/m3 Fine aggregate = 636.15 kg/m3 Coarse aggregate = 695.42 kg/m3 Recycled Coarse aggregate = 463.62 kg/m3 Water = 191.58 lit/m3 Water cement ratio = 0.4 6)Mix proportion for replacement of 50% coarse aggregate by demolished M20 grade concrete Cement = 427.93 kg/m3 Fine aggregate = 636.15 kg/m3 Coarse aggregate = 579.52 kg/m3 Recycled coarse aggregate = 579.52 kg/m3 Water = 191.58 lit/m3 Water cement ratio = 0.45

7)Mix proportion for replacement of 100% coarse aggregate by demolished M20 grade concrete Cement = 427.93 kg/m3 Fine aggregate = 636.15 kg/m3 Coarse aggregate = 0 kg/m3 Demolition column waste = 1159.04 kg/m3 Water = 191.58 lit/m3 Water cement ratio = 0.45

RESULTS

Compressive Strength Test values

No. of days of curing		7 days	28 days
Compressive Test values (N/mm^2) for different proportions	0%	22.16	34.2
	10%	21.3	32.88
	20%	20.5	31.55
	30%	20	30.2
	40%	19.1	27.92
	50%	18.22	27.11
	100%	14.20	23.11

CONCLUSION

- Recycling and reuse of building wastes have been found to be an appropriate solution to the problems of dumping hundreds of thousands tons of debris accompanied with shortage of natural aggregates. The use of recycled aggregates in concrete proves to be valuable building materials in technical, environment and economical respect. Use of Recycle coarse aggregate in concrete saves the disposal and land filling cost and produce a sustainable concrete for construction.
- On comparing the test results for concrete with fresh aggregate to that of concrete with Recycled aggregate, the compressive strength of Recycled aggregate concrete was slightly lesser than the conventional concrete.
- Up to 30% replacement of fresh coarse aggregate, the compressive strength was found above 30 N/mm^2
- When replaced by 50%, the compressive strength was observed 27.11 N/mm^2 which is higher than target strength of 26.6 N/mm^2. Hence, this concrete up to 50% replacement is more suitable for the regular construction works.
- When Natural Aggregate is fully replaced with Recycled aggregates, the compressive strength of the concrete after 28 days of curing process was found to be 23.11 N/mm^2. Concrete with 100% Recycled aggregate can be used for temporary works at construction site, trenches, low height retaining walls, etc. where load acting on the structure is comparatively less.

REFERENCS

- M.S Shetty - Concrete Technology, S. Chand and company ltd. Reprint 2008
- IS-456-2000 (plain and reinforced concrete requirements)
- IS-383-1970 (specification for materials)
- IS-10262-2009 (concrete mix design)
- Experimental investigation on concrete with partial replacement of coarse aggregate by G. Murali, K.R. Jayavelu, N. Jeevitha, M. Rubini and N.R. Saranya Engineering Research and Applications (IJERA) ISSN: 2248-9622 www.ijera.com Vol. 2, Issue 2, Mar-Apr 2012, pp.322-327.
- Demolished waste as coarse aggregate in concrete by Mohd Monish, Vikas Srivastava, V.C. Agarwal, P.K. Mehta and Rakesh Kumar. J. Acad. Indus. Res. Vol. 1(9) February 2013 540 ©Youth Education and Research Trust (YERT) Mohd Monish et al., 2013 ISSN: 2278-5213
- Use of building demolished waste as coarse aggregate in porous concrete by Shivakumar, M. N, Nithin K.S, B.M Gangadharappa. IJRET: International Journal of Research in Engineering and Technology ISSN: 2319-1163 | ISSN: 2321-7308
- Study of Recycled Concrete Aggregates by Jitender Sharma, Sandeep Singla, International Journal of Engineering Trends and Technology (IJETT) – Volume 13 Number 3 – Jul 2014
- Experimental investigations of coarse aggregate recycled concrete by D.V. Prasada Rao and P.L. Sindhu Desai, International Journal of Advances in Engineering & Technology, Nov., 2014. ©IJAET ISSN: 22311963

A Review on Recycled Concrete Aggregates by Preeti Saini, Deepakar Kr. Ashish P.G. SSRG International Journal of Civil Engineering (SSRG-IJCE) – EFES April 2015