A Review Paper on Utilization of Construction Demolished Waste in Concrete

Tarun Soni[1] Prof. Kashfina Kapadia[2] Prof. Md Sadique Anwar[3]
[1]M. Tech Scholar [2]Head of Department [3]Associate Professor
[1,2,3]Department of Civil Engineering
[1,2,3]Technocrats Institute of Technology - Advance, Bhopal, India

Abstract — Situation of Construction and Demolition Waste (C&D waste) is a global problem that affects not only on-site managers' level of construction management but also the industry's ability to grow sustainably. Wastes from construction and demolition are widely acknowledged as India's primary waste stream, and their recovery and recycling is crucial to the sustainable development of the building industry. The raw materials and construction products utilized have an impact on the diversity of the construction and demolition waste composition. As a result, the environmental performance of these materials is highly variable, and in some instances, it does not meet the regulatory limits set to protect the natural environment. In this exploration paper presents an examination of information on the ecological way of behaving of development and destruction squanders and reused totals concerning their solidarity and sturdiness.

Keywords: Recycling, Reuse, Construction and Demolition Waste, Building Materials, Cement, Sand

I. INTRODUCTION

Now a day India is a rapidly growing country, and their Management of waste is an environmental and social problem with marked social and technical interests, since its revaluation transforms it into new recycled material, creating a new material that is feasible for use in a second life cycle. Economical activities are required in greater efforts to reduce and prevent waste generation, contributing to the achievement of construction and Demodulation waste management 2016 waste policies, such as the Circular Economy Action Plan implemented in 2019 for promotion of the principles of sustainable development has led the governments to introduce legislation to encourage the use of recycled aggregates. Demolition sites and restoration schemes are sources of large amounts of solid waste, which today is being used as mere landfills. It includes steel, wood product, drywall, plaster, bricks tiles, asphalt shingles concrete, and different materials. Building waste recycling as coarse aggregates and fine aggregate is a modern approach for preventing environmental pollution through both reducing the stocks of waste and decreasing the use of natural aggregates.

II. LITERATURE REVIEW

Upadhyay (2017) There is a large amount of demolished waste generated every year in India and other developing countries. Since very small amount of this waste is recycled or reused. So, disposing this waste is a very serious problem because it requires a large amount of space. This study is a part of comprehensive program wherein experimental investigations have been carried out to evaluate the effect of partial replacement of coarse aggregate by demolished waste on compressive strength and workability of DCAC (Demolished Coarse Aggregate Concrete). For the study 7, 14 and 28 days compressive strengths were recorded. The previous study on this project shows that the compressive strength of the DCAC (Demolished Coarse Aggregate Concrete) is somehow resembles with the conventional concrete if used in a proper amount up to 25%. So in this study we have taken the demolished coarse aggregate 5%, 15%, 25% by weight of the conventional coarse aggregate and the concrete cubes were casted by that demolished coarse aggregate concrete then further tests conducted such as workability, compressive strength for that DCAC and the result obtained are found to be comparable with the conventional concrete.

Gadde & et al. (2017) There is a large amount of demolished waste generated every year in India and other developing countries. Demolished waste includes concrete blocks which can be recycled into stone aggregates through pre-screening, crushing, screening and separating of aggregate. The experimental investigations are carried out to evaluate the effect of partial replacement of coarse aggregate by demolished waste on compressive strength and workability of demolished concrete.

Teja & et al. (2018) Demolition of old structures to make way for new and modern ones is common features in metropolitan areas due to rapid urbanization. However, very little demolished concrete is recycled or reused. The strict environmental laws and lack of dumping sites in urban areas, on one hand, are making the disposal of demolition wastes problematic while, on the other hand, the quarrying of raw materials is becoming difficult. The present work presents the results of experimental investigations carried out to evaluate the effect of partial replacement of cement, fine aggregate and coarse aggregate by different parts of demolished wastes on strength and workability of concrete made. For the study, design mix concrete of grade M25 (Referral concrete) was prepared using IS 10262-2009. Thereafter, the replacement of different constituents of concrete, one at a time was carried out by replacing these with the different sieved fractions of crushed demolition waste. The compressive strength at 7, 14 and 28 days and workability in terms of slump value were measured. The compressive strength of these mixes was measured on 100mm cubes. Test results show that the behaviour of recycled waste concrete and the adding of Ad-mixture. The compressive strength of recycled concrete (FAR concrete) with 10%, 15% and 20% fine aggregate replacement by demolition waste coarse aggregate at 7,14 and 28 days is comparable to that of referral concrete. The compressive strength of recycled concrete (CAR concrete) made using 10% of demolition waste coarse aggregate is almost similar to referral concrete. Further, the results indicate that still higher replacement of the constituent

materials is possible without much compromising the 28 days strength and workability.

Ede & Bankole (2019) Over the years, advancement in the construction industry and the need for change and improvement towards new structures have led to increase in the use of construction materials and generation of construction and demolition wastes (CDW). These construction wastes are aesthetically displeasing and not of good environmental impact. Its presence in the environment also occupies space. This study reviewed researches carried out independently by different researchers to establish the recycling of concrete waste for fresh construction purposes. This puts into consideration the integrity of new structures built from using these concrete wastes; hence researching into its impact on certain properties such as workability, compressive strength, water absorption and more. The line drawn from the distinct works established the possibility of recycling concrete wastes for further use in construction purposes with retention of structural integrity. The results from two research works compared established 25% to 30% optimum replacement level of recycled concrete with satisfactory structural properties.

Sagar & Juneja (2019) Deterioration of patches is a critical problem as the patches deteriorate after some time because there is not proper bonding between existing bituminous of road and patch placed over there. In this Research paper, initially, we analyzed the strength of demolished aggregate and conventional aggregate individually. After that different combination of a binder such as lime and cement mixed with waste demolished aggregates whereas bitumen is mixed with conventional aggregate is examined. The aim of this Research is to examine the feasibility of construction demolished waste for improving the performance of patches. The main contribution of this research is to utilize construction demolished waste. The research is conducted in two phases: (i) experimental work and (ii) visual inspection. The standard tests such as Aggregate Impact value Test, Crushing value test, Specific Gravity test, Water Absorption test, and Los Angeles Abrasion test, flow value test and Marshall Apparatus test are performed. The visual inspection is performed by on foot. The results are compared by attaining values such as using bituminous patches, lime patches and concrete patches. From the experiment, it is determined that the concrete patches are stronger compared to bituminous patches and the life span of concrete patches is more than bituminous patches.

Goumathy & et al. (2021) Concrete waste is generated whenever any demolition activities take place. Recycling concrete waste as recycled aggregate is one of the methods adopted to reduce environmental impact. When the useful life of the structure is over it will be demolished and all the demolished wastes just find their way to landfills. Finding large areas for landfills is becoming very difficult. On the other hand continuous extraction and quarrying of natural aggregates for construction is causing depletion of natural resources. There cycling of demolished construction waste in to aggregates to be used in new engineering application provides a promising solution to both the problems. In this work the usability of demolished waste as coarse aggregates in new concrete is attempted. This experimental investigation involves evaluating the properties of the constituents of concrete including the demolished concrete wastes as coarse aggregate replacing by 0%, 10%, 20% and 30% in new concrete. The results of this experimental study is aimed at examining the properties and strength of recycled aggregate concrete made from different replacement ratios of recycled aggregates from natural aggregates.

Kadam & et al. (2021) Concrete is the second most used construction material in the world. Here concrete is made from composition of cement, fine aggregate (sand), coarse aggregate and demolished concrete waste generated from demolished construction. Demolished concrete aggregate is replaced as coarse aggregate in concrete. Use of demolished concrete waste as coarse aggregate in concrete leads to reduce construction cost and also it helps to reduce the percentage of coarse aggregate. In this project we have study on partial replacement of demolished concrete waste as coarse aggregate in concrete. Demolished concrete can be reused or recycled, by crushing it to specific size., cleaned so that we can use it in mixture as coarse aggregate in fresh concrete. In this study 20% and 25% replacement for coarse aggregate by demolished concrete aggregate for M-30 mix is done. Compressive strength result for that demolished aggregate concrete are obtained and these results are comparable with conventional concrete.

Umamaheswari & Ajai (2021) The cost of construction materials are increasing to high rates for a conventional building is a major factor that affects the housing delivery worldwide. This has necessitated research for alternative cost effective materials in construction. There is a large amount of demolished waste generated every year in India and other developing countries. Demolished waste includes concrete blocks which can be recycled into stone aggregates through pre-screening, crushing, screening and separating of aggregate. The experimental investigations will carried to evaluate the effect of partial replacement of coarse aggregate by demolished waste on compressive strength and workability of demolished concrete. In this project, I will replace fine aggregates and coarse aggregates with the demolished concrete in the range 0%, 05%, 10%, 15% using M20, M25, and M30 grade of concrete. Sieve analysis will perform for recycled demolished concrete and coarse aggregates. The prepared concrete mix will compare and test in terms of compressive strength and Split tensile strength to conventional concrete. The test will be performed at 7 and 28 days in order to evaluate the strength properties. Finally, comparing the strengths of all concretes and prefer the best strength concrete.

Bhise & et al. (2021) Concrete is the main component of construction. Concrete is a composition of cement, fine aggregates, coarse aggregates, and water. But the rapid depletion of those resources and therefore the increasing cost is emerging as an attention-seeking issue, thanks to which construction industries face crises for the straightforward availability of those resources. This is why various alternatives are being adopted to counter this problem like reuse and recycling of construction waste. Our project aims in this field of utilizing demolished concrete. During this project, we replaced coarse aggregates with the demolished concrete within the range 0%, 5%, 10%, 15%, 20% using M25 grade concrete. The prepared concrete mix is compared

and would be tested in terms of compressive strength, workability test, etc. to standard concrete. The test is going to be performed at 7, 14, and 28 days to gauge the strength properties. We also carry out the rate analysis for M25 Reinforced concrete work with 1.5% steel slab using normal conventional concrete and for same RCC work using demolished concrete.

Naqaty & Kumar (2021) Nowadays road construction with rigid pavements constructed rapidly. Waste material management is very essential for better environment. The environmental condition improves by utilization of waste material it may be biodegradable or may be not biodegradable. This study is mainly focused on utilization of demolished concrete partially replaced with coarse aggregate in rigid pavements with an effective manner. Its use depends upon the outcomes which shall be obtain with addition in different percentages and performed different experiments.

III. CONCLUSIONS

Based on the consider, taking after conclusions have been drawn:

1) After the test comes about, it can be induced that the substitution of fine total and coarse total by devastation squander can be prescribed.
2) Blocks created with development and demodulation reused totals displayed way better comes about in all properties. The
3) Removal of the fine fabric given more prominent compressive quality.
4) The characteristics part malleable quality were fulfilled.
5) Water assimilation by the clearing square was inside allowable constrain.
6) The characteristics flexural quality was fulfilled.

IV. FUTURE DIRECTIONS

In general, use of Construction and Demolition Waste in concrete is an environmental friendly approach which enhances the property of concrete mix up to certain level of replacement. Use of Demolition Waste is a solution for the global problem of recycling Demolition Waste. It is an approach to reduce pollution, carbon foot print and land filling of waste without compromising with the properties of concrete. Some researchers have done research to utilize this waste in various fields.

Researches related to utilization of C & D waste done till now and needs attention in this direction. There is a vast scope of this powder in the field of light weight non load bearing structures like false roofing, lintels, roofing and many such areas. Study related to effect of this waste on higher as well as low grade concrete also requires attention. Other than concrete application of this waste in soil stabilization, flexible pavement, sub base preparation etc. can be approached.

REFERENCES

[1] N V V S S L Shilpa Devi Gadde ,P.Mani Kumar, K.Abhiram, A Study on Demolished Concrete by Partial Replacement of Coarse Aggregate International Journal of Engineering and Innovative Technology (IJEIT) Volume 6, Issue 9, March 2017 ISSN: 2277-3754 ISO 9001:2008 certifieddoi:10.17605/OSF.IO/JNYZE

[2] Ms.K.Goumathy1, Avinash.S2, Ramkumar.V3, Vishal.B4 utilization of demolished concrete waste as partial replacement of coarse aggregate in concrete it in industry, vol. 9, no.3, 2021 Published online 15-April-2021 ISSN (Print): 2204-0595 ISSN (Online): 2203-1731

[3] Ajit M. Kadam 1 Rohan B. Patil2, Harshal R Jadhav3, Aditya S. Jadhav 4 Aditya Y. Salunkhe5 Kanipnath G. Yantal6 a study on demolished concrete waste as partial replacement of coarse aggregate in concrete International Research Journal of Engineering and Technology (IRJET) Volume: 09 Issue: 05 | May 2022 www.irjet.net e-ISSN: 2395-0056 p-ISSN: 2395-0072 © 2022, IRJET | Impact Factor value: 7.529 | ISO 9001:2008 Certified Journal

[4] Shirshendu Jana *1, Prof. Dr. Biman Mukherjee*2 experimental study on the effect of partial replacement of fine aggregate and coarse aggregate in concrete using demolished building materials International Research Journal of Modernization in Engineering Technology and Science (Peer-Reviewed, Open Access, Fully Refereed International Journal) Volume:05/Issue:07/July-2023 Impact Factor- 7.868 www.irjmets.com e-ISSN: 2582-5208

[5] Dr.R.Umamaheswari , Ajai.C Experimental Study of Partial Replacement of Construction and Demolition Waste in Concrete International Journal of Advances in Engineering and Management (IJAEM) Volume 3, Issue 7 July 2021, pp: 4225-4232 www.ijaem.net ISSN: 2395-5252

[6] Vikas Srivastava1*, Mohd Monish2, V. C. Agarwal3, P. K. Mehta4 Demolition Waste as Cement Replacement in Concrete J. Environ. Nanotechnol. Volume 2, No.3 pp. 17-20 ISSN (Print) : 2279-0748 ISSN (Online) : 2319-5541 doi : 10.13074/jent 2013.09.132026

[7] Kamesh Bhise, Kapil Maurya, Anu Murali, Krishna Choudhary Experimental Investigation on Partial Replacement of Coarse Aggregates by Demolished Concrete International Journal of Engineering Research & Technology (IJERT) Special Issue - 2021 ISSN: 2278-0181 NTASU - 2020 Conference Proceedings

[8] Mohd Monish1, Vikas Srivastava1, V.C. Agarwal1, P.K. Mehta2 and Rakesh Kumar2 Demolished waste as coarse aggregate in concrete J. Acad. Indus. Res. Vol. 1(9) February 2013 540 ISSN: 2278-5213 ©Youth Education and Research Trust (YERT) Mohd Monish et al., 2013

