UTILIZATION OF DEMOLISHED CONCRETE WASTE FOR NEW CONSTRUCTION

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ABSTRACT *The concrete material has to be demolished during ongoing or old construction. The concrete waste obtained from these processes is called "Demolished Concrete". The environmental protection and for promotion of the principles of sustainable development has led to recycled aggregate. Demolished sites and restoration schemes are sources of large amounts of solid waste, which today is being used as landfill. The reusing and recycling the demolished concrete a better economy can be achieved without an effecting of environment.*

In the past studies as per literature study most of the researches done only strength parameters of concrete with the help of different percentages of demolished aggregates. In this present study in addition of strength characteristics durability is also done. This project deals with the study of workability, compressive strength, split tensile strength, flexural strength and durability of concrete by replacing coarse aggregates with demolished concrete waste aggregates. The percentage replacement of demolished aggregated used in this study is 0%, 10%, 20%, 30%, 40% and 50%.

1. INTRODUCTION

Over the years there has been a change in the use of building materials. Cheep and locally available materials such as moulded earth bricks, stones, thatch, timber, steel, aluminium, plastics and fibers of various types and forms have replaced the traditional and costly materials. However, all these materials have been developed to meet specific requirements of climate, availability of skilled labour and specific raw materials to affect the desired economy.

Although construction and demolition waste materials are often grouped together under the generic term "C&D waste", the materials generated from these activities can be quite different. One reason for this is that construction activities make use of currently available manufacturing processes and materials while demolition activities often remove older structures. Older buildings can contain materials no longer used in the construction industry today, resulting in a different waste stream. An example of this is asbestos, which was a common insulation material forty years ago, but is now regarded as hazardous waste. Differences between construction and demolition waste are also due to the nature of each process. Demolition procedures typically remove the whole structure, resulting in 20-30 times more waste material than construction activities. Materials such as metal, which is rarely wasted during the construction process, can form a significant percentage of total demolition waste when a building is torn down.

Uses of demolished aggregates

1. Conserve diminishing natural aggregate resources
2. Use of construction waste
3. Protection of environment
4. Economical
5. Used where the natural aggregates are not easily available and bearing capacity of soil is less

Objectives of the study

The specific objectives of the present investigation are listed below.

1. To use of the demolished and construction waste aggregate in the new concrete as the recycled concrete aggregate reduces the environmental pollution as well as providing an economic value for the waste material.
2. To study the utilization of demolished and construction waste as a replacement of natural coarse aggregate.
3. To study the mechanical and physical properties of demolished and construction waste aggregate by conducting experimental work.
4. The aim of this study is to use the demolished concrete waste as aggregate in the production of new concrete. The concrete waste is collected from the local demolished structure.
5. The primary objective is to foment the reuse and recycling of this waste and other forms of valorization with a view to contributing to the sustainable development of activities in the construction sector.

2. LITERATURE REVIEW

Mirjana Malesev & Vlastimir Radonjanin, (2010), [1] for this study Ninety-nine specimens were made for the testing of the basic properties of hardened concrete. From this study it was concluded that the way of preparing recycled aggregate for concrete mixtures influences the concrete workability: workability of concrete with natural and recycled aggregate is almost the same if water saturated surface dry‖ recycled aggregate is used.

Hardik Gandhi & Dr.Dharshana Bhatt, et al.,(2011) [2] In the present study recycled coarse aggregate have been used to replace virgin coarse aggregate. From this study it was concluded that the experimental results show that the compressive strength of concrete made of natural coarse aggregate and recycled coarse aggregate is approximately same.

Mohd Monish et al., (2013), [3] This study is a part of comprehensive program wherein experimental investigations have been carried out to assess the effect of partial replacement of coarse aggregate by demolished waste on workability and compressive strength of recycled concrete for the study at 7 and 28 d. From this study it was concluded that study recycled aggregate concrete may be an alternative to the conventional concrete.

3. MATERIALS AND TEST METHODS

Cement

In this study Ordinary Portland cement of 53 grade (ACC cement) has been procured and has been used.

Fig 1: OPC 53 Grade cement

Fine aggregates

Fine aggregate are basically sands won from the land or the marine environment. Fine aggregates generally consist of natural sand or crushed stone with most particles passing through a 4.75mm sieve. The fine aggregate used in this study is river sand which is obtained from local company.

Fig 2: Fine aggregates

Coarse aggregates

Coarse aggregates are particles greater that 4.75mm but generally range between 9.5mm to 37.5mm in diameter. They can either be from primary, secondary or recycled sources. In this study coarse aggregate of nominal sizes of 20mm, 12mm are used.

Fig. 3: Coarse aggregates

Demolished aggregates

The construction and demolition wastes are obtained from a local building that has been demolished and constructed. The aggregates passing through IS sieve 20mm and retained on 12.5mm are taken.

Fig 4: Demolished aggregates

Mix design of concrete

The following table shows the mix proportion of concrete

MATERIAL	CEMENT	FINE AGGREGATES	COARSE AGGREGATES	WATER
Density	438 kg/m3	717.12 kg/m3	1115 kg/m3	197 kg/m3
Proportions	1	1.63	2.54	0.45

Tests to be conducted on concrete

Workability test

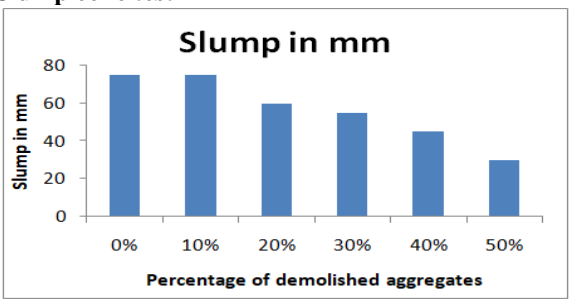
1. Slump cone test
2. Compaction factor test

Strength of concrete

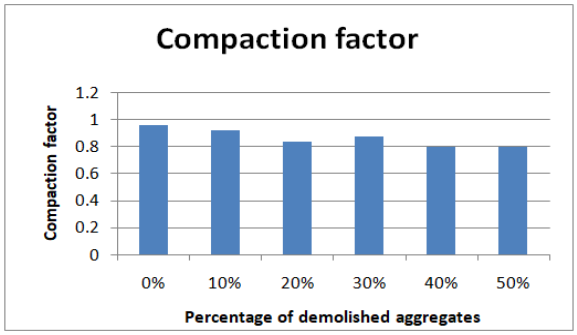
1. Compressive strength
2. Split tensile strength
3. Flexural strength
4. Durability

4. RESULTS AND ANALYSIS

Slump cone test

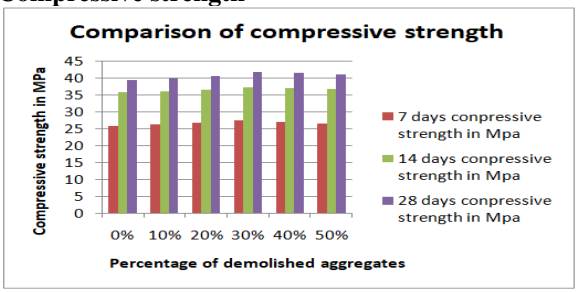


Compaction factor test

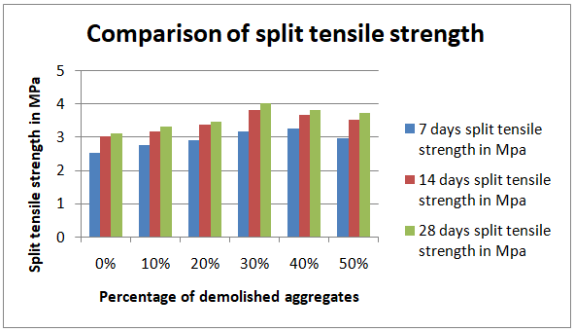


Strength of concrete

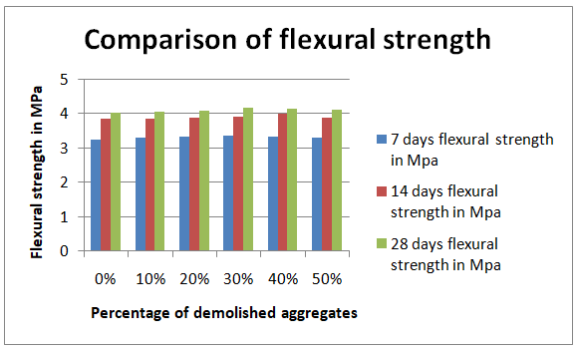
Compressive strength



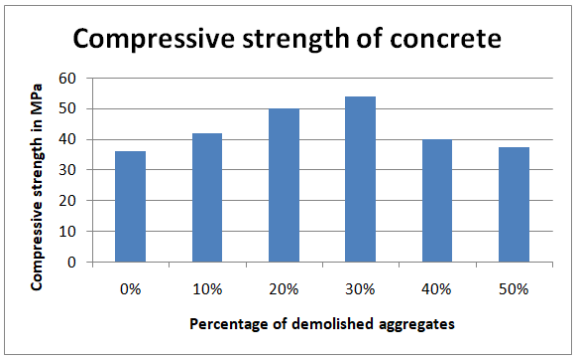
Split tensile strength



Flexural strength

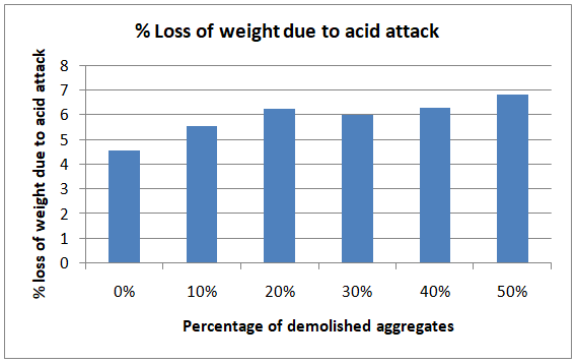


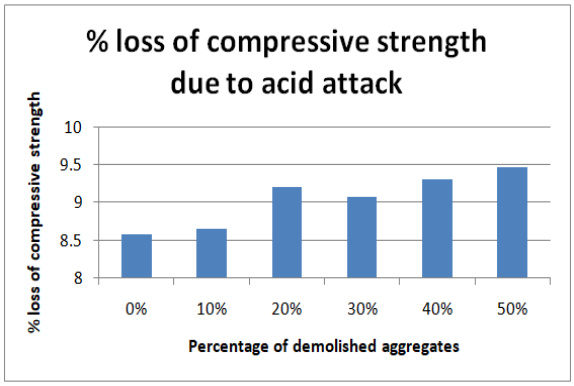
Rebar hammer test



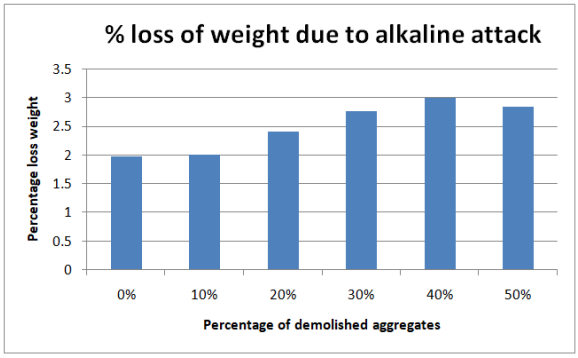
Durability of concrete

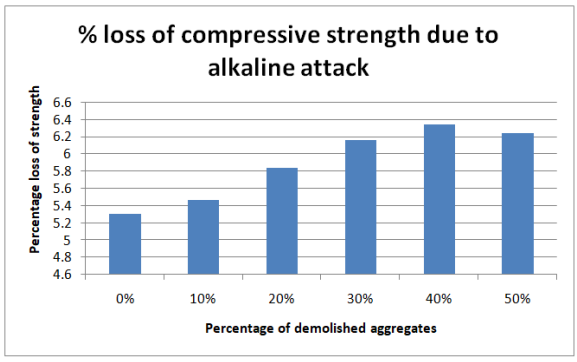
Acid attack



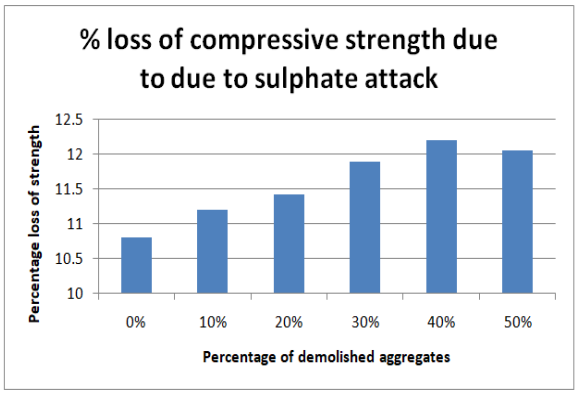


Alkaline attack





Sulphate attack



5. CONCLUSIONS

From the above study the below conclusions were made:

1. The use of demolished concrete as a partial replacement of coarse aggregates provides us an alternative source to use the waste into a useful material.
2. The disposal of demolished waste can be used as a coarse aggregate provides the reduction in burden on landfill disposing and environmental pollution.

3. The demolished concrete density is less as compared with the conventional concrete which reduces the cost of the concrete and produces the light weight concrete structure.
4. Demolished concrete is generally used where the natural coarse aggregate are not available easily and bearing capacity of soil is low.
5. The value of slump decreases with increase in the percentage of demolished Waste from 0% to 50%.
6. The value of compaction factor decreases with increase in the percentage of demolished Waste from 0% to 50% .
7. Compressive strength, split tensile strength and flexural strength of the concrete is increases with increase in the percentage of demolished material from 0% to 30% after 30% demolished aggregates the value of strength decreases.
8. The percentage loss of weight due to acid attack and alkaline attack increases with increasing the percentage of demolished aggregates.
9. The percentage loss of compressive due to acid attack and alkaline attack increases with increasing the percentage of demolished aggregates.

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