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UTILIZATION OF DEMOLISHED CONCRETE WASTE FOR NEW CONSTRUCTION

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ABSTRACT

In recent years demolished concrete waste handling and management is the new primary challenging issue faced by the countries all over the world. It is very challenging and hectic problem that has to be tackled in an indigenous manner, it is desirable to completely recycle demolished concrete waste in order to protect natural resources and reduce environmental pollution In present day Demolished Concrete waste handling and management is challenging one in all over the countries in the world. Recycling the Demolished Concrete will reduces the environmental pollution and protect the natural resources. This research is focused on utilizing the Demolished Concrete waste and reduces the generation of construction waste. This research includes a collection of Demolished Concrete from the demolition of building at site, Crushing Demolished Concrete waste and is separated with different sizes using sieve analysis. Various sizes of Aggregates is treated with heating and chemical process. Finally the Demolished Concrete Aggregate (DCA) is replaced by various percentages of 0 %, 5 % , 10 %, 15%, 20% and test can be conducted and compared with nominal Concrete.

Key Words: Demolished Concrete Aggregate (DCA)

1. INTRODUCTION

INTRODUCTION TO DEMOLISHING:

India is presently generating construction and demolition (C & D) waste to the tune of 23.75 million tones annually and these figures are likely to double fold in the next 7 years. C & D waste and specifically concrete has been seen as a resource in developed countries. Works on recycling have emphasized that if old concrete has to be used in second generation concrete, the product should adhere to the required compressive strength. This paper deals with the review of the existing literature work for the use of recycled concrete as aggregates in

concrete in respect of mainly the compressive strength and proposes and approach for use of recycled concrete aggregate without compromisingthe strength. The need for demolition, repairs andrenewal of concrete and masonry structures is rising all over the world, more so in the developing countries.

STEPS INVOLVED IN DEMOLISHING

Normally, the building which is going to be demolished is less than 1750 cubic feet then it doesn't need any permission for the demolition. Now,coming to the demolition then

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it is a process destroying a building after its lifeperiod with the aid of few tools or by using other methods. In the process of demolition, if the explosives are used then such a process is called as the implosion. Each and every structure of the civil engineering has a certain period of life and after that, it has to be demolished by following the safety measures, the distinct steps are involved in the process of demolition at the time of the process of demolition.

2. LITERATURE REVIEW

Asif Husain1 , Majid Matouq Assas2 et al.,(2013) states that the use of dismantled aggregate in making fresh concrete will also help in reduction of solid waste dumping on existing landfill sites. The reuse of dismantled concrete will help in improvement of overall environment of the region. Firstly, by reduction in mining and secondly reduction in air pollution resulting from production of aggregates (dust pollution) and transportation of aggregate from mining to consumption point (vehicular pollution). Thus, study shows that dismantled concrete is not solid waste but useful material to be recycled to prepare fresh concrete, which saves the cement and make the concrete economical.

Goudappa Biradar1 et al., (2015) states that the recycled aggregates that are obtained fromconcrete specimen make good quality concrete. For improving the quality of recycled coarse aggregate, various surface treatment methods such as washing the recycled aggregates with water and diluted acid were investigated. Mix designs can be made using recycled aggregate for structural concrete elements instead of disposing off the recycled concrete to achieve economy.

3. METHODOLOGY

The methodology will be adopted for theproject work.

- Literature Survey
- Material Collection
- Mix Proportions

  f Specime

  Casting o
- Testing of Results
- Conclusion

METERIALS AND METHODS

The raw material utilized in concrete are subjected to several experiments to determine their properties and to decide their usability in concrete. Concrete is a synthetic material, which is made up of cement, coarse aggregates, fine aggregate and water. In this experiment additionally I have added an artificial admixture (super plasticizer) to enhance some of theproperties of concrete. The material utilized are cement, M-sand, recycled aggregate, coarse aggregate and artificial admixture. In order to check the use of demolished waste as coarse aggregates in concrete in recently constructed project, the mechanical properties for the recycle aggregate were determined, with specific gravity, water absorption, abrasion resistance, Aggregate Impact Value and Aggregate Crushing Value.

- Cement
- Fine aggregate
- Coarse aggregate
- Recycled aggregate

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Super plasticizer Conplast

 Admixture –

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SP 430

 Water

In this analysis, control mix was designed asper IS10262:1986 to reach a target compressive strength of 30 MPa. The casted cubes are test for7, 14, 28 days Compressive strength, Splittensile strength and 14, 21, 28 days Flexural strength test. The wet mixture was filled into the mould in 3 layers with the help of solve the mix is compacted with twenty-five blows of

4.5 kg rammer on level and rigid platform. The number and size of samples are determined by the specific of the tests. The excess mixture was scraped off and also the mould levelled using a straight edge. The mould and its content were left for twenty four hours before the removal of the mould. Identification marks were inscribed on the specimen for simple referencing.

Cement

A cement is a binder, a chemical substance used for construction that sets, hardens, and adheres to other materials to bind them together. Cement is seldom used on its own, but rather to bind sand and gravel together

Fine aggregate

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Fine aggregates are essentially any natural sand particles won from the land through the mining process. Fine aggregates consist of natural sand or any crushed stone particles that are ¼" or smaller. This product is often referred to as 1/4"' minus as it refers to the size, or grading, of this particular aggregate.

Coarse aggregate

Coarse aggregates are any particles greater than 0.19 inch, but generally range between 3/8 and 1.5 inches in diameter. Gravels constitute the

majority of coarse aggregate used in concretewith crushed stone making up most of the remainder.

Recycled aggregate

Recycled concrete aggregate is the term used to describe the material produced from crushed construction and demolition waste, primarily consisting of concrete but also including aggregate materials such as sand, gravel, slag, and crushed stones.

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ADVANTAGES

- Reduction on Environmental Impact.
- Cost Saving.
- Material Saving.
- Energy Saving.
- Conserves Landfill Space.
- Creates job.
- Eco-friendly.
- Versatile.
- Durable

DIS-ADVANTAGES

- The downgrading of the quality of concrete.
- Increase in water absorption capacityranging from 3 to 9%.
- The decrease in the compressive strength ofconcrete.
- Reduces the workability of concrete.
- Lack of specification and guidelines.
- Brittle concrete might be mixed within theaggregate, leading to uneven grading.
- Visual inspection is necessary to ensure themix is refined.

4. MATERIALPROPERTIES

Table1. Properties of Cement.

S. No.	Property	Cement
1.	Initial setting time	44minutes
2.	Final setting time	620 minutes
3.	Consistency	33%
4.	Specific Gravity	3.15

Fine Aggregate.

Natural river sand (ZoneII) is used as a Fine Aggregate. It is passes through the 4.75mm IS sieve and then used for making of Concrete.

Table2.PropertiesofFineAggrega te.

S.No.	Property	FineAggregate

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1.	Fineness modulus	2.52
2.	Specific gravity	2.70

Course Aggregate.

The Course Aggregate is properly sievedand 12.5mm, 20 mm aggregates were used for Concrete.

Table3.Properties of CoarseAggregate.

S.No.	Property	CoarseAggregate
1.	Fineness modulus	2.52
2.	Specific gravity	2.7

Demolished Concrete Aggregate.

Crushing a Demolished Concrete waste and is separated with different sizes using sieve analysis. Various sizes of DCA was treated with heating and chemical process.

Table1.Properties of Coarse Aggregate.

S.No.	Property	DCA
1.	Specificgravity	2.66
2.	Waterabsorption	1.6%

PARAMETERS FOR MIX DESIGN M40

Grade Designation = M-40

Type of cement = O.P.C-43 grade Brand of cement = Vikram (Grasim)

Admixture = Fosroc (Conplast SP 430 G8M)Fine Aggregate = Zone-II

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Sp. Gravity Cement = 3.15Fine Aggregate = 2.61

Coarse Aggregate (20mm) = 2.65Coarse Aggregate (10mm) = 2.66

Minimum Cement (As per contract) = 400 kg / m^3Maximum water cement ratio (As per contract) = 0.45

CONCRETE TESTING

SLUMP TEST

Concrete slump test or slump cone test is to determine the workability or consistency of concrete mix prepared at the laboratory or the construction site during the progress of the work.Concrete slump test is carried out from batch to batch to check the uniform quality of concrete during construction.

COMPRESSIVE STRENGTH TEST

Compressive Strength Definition

Compressive strength is the ability of material or structure to carry the loads on its surface without anycrack or deflection. A material under compression tends to reduce the size, while in tension, size elongates.

Compressive Strength Formula

Compressive strength formula for any material is the load applied at the point of failure to the cross-sectionarea of the face on which load was applied.

Compressive Strength = Load / Cross-sectionalArea

Procedure: Compressive Strength Test ofConcrete Cubes

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- Thirdly, it should be able to apply loads at aconstant rate within the range 0.7 to 1.4 MPa/min (1.2 to 2.4 MPa/min based on IS 5816 1999) splitting tensile stress until the specimen fails.

Fig.1:Split cylinder testing machine

RESULTS

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SPLIT TENSILE STRENGTH TEST

Testing machine shall meet the followingrequirements:

- Firstly, it shall conform to the requirementsof Test Method C 39/C 39M.
- Secondly, testing machine should be able toapply the load continuously and without shock.

SLUMP TEST

To determine the workability of concretemix by slump test conducted by as per IS 1199-1959.This allows the concrete to subside and theslump shall bemeasured immediately by determining the difference between the height of the mould and highest point of the specimen being tested. The test results are given in the table.

SL .NO	**DMC%**	**SLUMP (mm)**
1	0	32mm
2	5	29mm
3	10	25mm
4	15	21mm
5	20	18mm
6	30	12mm

HARDENED CONCRETETESTCOMPRESSIVESTRENGTHTEST

It has performed on standard compression testing machine of **2000KN capacity,** as per IS: 516- 1959 and thecastingofconcretecubesof**size150mmx150mmx150mm**ofcompressivestrength for7daysand 14 days.

TESTINGOFCONCRETECUBES

The concrete cubes after casting is allowedfor7days and 14 days curing. After curing, to determine the ultimate compressive load by using Compression Testing Machine(CTM).

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From the ultimate load, the compressive strength is obtained by the following formula, **Compressive** strength=Ultimateload/Area(N/mm^2)

DMC%	DAYSOF TESTING	COMPRESSIVESTRENGTH OFCONCRETE(N/mm^2)		
0	7	13.56	13.95	13.75
	14	19.26	19.02	18.95
5	7	14.02	14.25	14.36
	14	19.85	19.65	19.88
10	7	14.55	14.95	14.78
	14	19.88	20.55	20.75
15	7	10.55	10.35	10.12
	14	14.80	15.25	15.15

SPLITTENSILESTRENGTHTEST

It has performed on standard compression testing machine of **2000KN capacity,** as per IS :516-1959 andthe casting of concrete cylinder of **size150mm dia and 300mm length** of split tensile strength for 7days and14days.

TESTINGOFCYLINDER

The concrete cylinders after casting is allowed for 7days and 14 days curing. After curing, todetermine the ultimate tensile load by using CompressionTesting Machine (CTM). Fromthe

SL.NO	DMC%	7 DAYSOF TESTING	14DAYSOF TESTING
1	0	2.77	2.91
2	5	2.32	3.15
3	10	2.01	2.36
4	15	2.12	2.52
5	20	2.16	2.35

Split tensile strength = $2P/(\pi DL)$ (N/mm^2)

FLEXURAL STRENGTH TEST

It has performed on standard flexural testing machine of **2000KNcapacity,**asper IS:516- 1959 and the casting of

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concrete beam of **size 500mm x 100mm x 100mm** for determine flexural strength for7daysand14days.

TESTINGOFBEAM

The concrete beams after casting isallowed for7days and 14 days curing. After curing, to determine the following formula, **Flexural strength =PL/BD^2**

CONCLUSION

Concrete recycling will become one of the most

SL. NO	DMC%	7 DAYSOF TESTING	14 DAYS OFTES TING
1	0	7.1	7.86
2	5	6.6	6.9
3	10	5.78	6.46
4	15	5.18	5.51
5	20	4.98	4.90

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Concrete in which binders, additives and aggregates are all made of cement or materials of cement, and allof these materials can be used as raw materials of cement after hardening. Concrete which contains waste products as aggregate is called ‘Green’ concrete. This paper focuses on the feasibility of construction waste aggregate to making new green concrete. Various standard tests were carried out using recycled aggregate such as water absorption, sieve analysis workability and compressive strength of the mixes using 150mm standard cubes. This research is focused on utilizing the Demolished Concrete waste and reduces the generation of construction waste. This research includes a collection of Demolished Concrete from thedemolition of building at site, Crushing Demolished Concrete waste and is separated with different sizes using sieve analysis. Various sizes of Aggregates is treated with heating and chemical process. Finally the Demolished Concrete Aggregate (DCA) is replaced by various percentages of 0 %, 5 % , 10 %, 15%, 20% and test can be conducted and compared with nominal Concrete.

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