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USES OF CONSTRUCTION AND DEMOLITION WASTE AS PARTIAL REPLACEMENT OF FINE AGGREGATE AND COARSE AGGREGATE IN CONCRETE

Ranjan Kumar Gupta
Department of Ceramic Technology, Government College of Engineering and Ceramic Technology Kolkata, India

ABSTRACT
Currently, Situation of Construction and Demolition waste (C&D waste) is a worldwide issue that concerns not only the construction management level of on-site managers but also the sustainable development of the construction industry. Construction and demolition wastes are widely recognized as the main waste stream in India and their recovery and recycling is an important issues in sustainable building industry development. The waste composition of construction and demolition is highly heterogeneous and influenced by various factors, including the raw materials and construction products used. The environmental performance of these materials is therefore considerably variable and, in some cases, does not comply with the regulatory limits established to ensure the protection of the natural environment. In this research paper presents an analysis of data on the environmental behavior of construction and demolition wastes and recycled aggregates in terms of their strength and durability.
KEY WORDS: - *Reuse, Recycling, Construction And Demolition Waste, Building Materials, Cement*

1. 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.

2. MATERIALS AND EXPERIMENTAL PROJECT

The following materials were used in this research Paper: Construction and Demolition waste, Ordinary Portland cement53, Coarse aggregate, fine aggregate, Superplasticizer, and water.

2.1 construction and Demolition waste: construction and Demolished waste were collected from Dhaulagiri Kolkata. Construction and Demolished waste on being tested in our laboratory showed pozzolanic properties. Construction and Demolished waste as a pozzolanic material was used in replacement of coarse aggregate and fine aggregate. The properties of recycled aggregates are given in Table.

Properties	Value
Color	Light Brown
Specific gravity	2.35
Sieve analysis	1.93mm
Water absorption	2.85
Bulk density(kg/m3)	1560

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2.2 Cement

it is the important binding material in concrete. In this paperwork we are using Ordinary Portland Cement (OPC) of grade 53. All the tests were done by carried as per recommendations of IS: 4031-1988. The properties of the cement were determined from various tests conforming to Indian Standard (IS) are listed. Shown in fig.

Ordinary Portland cement 53

S.NO.	PROPERTIES	OBSERVATION
1.	Fineness	9% reside on IS90-micro sieve
2.	Specific gravity	3.45%
3.	Compressive strength (28 days)	53
4.	Standard consistency	26.1%
5.	Initial setting time	30min
6.	Final setting time	220min

2.3 Fine Aggregate: Fine aggregate is called sand from the river or the marine environment. Fine aggregate generally consists of natural sand or crushed stone with most particles passing through a sieve of 9.5mm. Fine aggregate is intergranular materials such as sand, gravel, or crushed stone that are a product. They are also one of the raw materials that are essential ingredients in concrete. For a good concrete mix, aggregates need to be clean, hard, strong particles free of absorbed chemicals or coating of clay and other fine material that could cause the deterioration of concrete.

Physical Properties are as follow

- Specific gravity: 2.54
- Fineness modulus: 3.12
- Density: 1.64gm/cc
- Void ratio: 0.65

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Fine Aggregate

2.4 Coarse Aggregate: Coarse aggregate occupied 63 to 72% of the volume of the concrete. Coarse aggregate is the one of important concrete materials. The coarse aggregate was retained at 4.75 mm. It can be found in rocks bed of boulders crushing. It is available in different shapes (Irregular, Rounded, Flaky, Angular) and sizes (6mm,10mm,20mm). it should be free from mud or dirt and any organic impurities materials.

Coarse Aggregate

2.5 Super Plasticizer: Super plasticizers are usually highly distinctive in their nature, and they make possible the production of concrete which, in its fresh or hardened state, is substantially different from concrete made using water-reducing admixtures. Conplast SP430A2: This is the name of the super plasticizing admixture manufactured by "FOSCROC Chemicals" used in this research paper.

3. MIX RATIO

The mix design is done in accordance with IS: 10262 (1982). The concrete was mixed in the pan mixer, in such a way to avoid loss of water or other material. All Mixing was done in a mechanical mixer. Construction and Demolition, Cement, coarse aggregate, sand, and other materials was mixed dry.

The following parameters were used for mix design:

- Grade of concrete = M40
- Type of Cement = OPC-53 Grade
- Brand of Cement = Ramco
- Admixture Used = Conplast SP430A2(FOSCROC Chemicals)
- Fine Aggregates =Zone II
- Specific Gravity of Cement = 3.04
- Specific gravity of FA = 2.53
- Specific Gravity of C.A
- 10mm = 2.69

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- 6mm =2.63
- Moisture content of FA =less than 5%

4. RESULTS AND DISCUSSION

4.1 workability Result: The result was done in the Slump Cone apparatus. The size of the apparatus is a Bottom diameter: 20 cm, a Top diameter: 10 cm, Height: 30 cm and the thickness of the metallic sheet for the mould should not be thinner than 1.6 mm. the prescribed limit of slum is 600 mm-800 mm.The results of the workability test conducted in comparison to the prescribed limits for all the specimens are tabulated below in Table.

Sl.no	Mix	Slump Flow(mm)
1	CA 0% FA30%	683
2	CA 30% FA0%	765
3	CA 30% FA30%	740
4	CA 50% FA50%	755

4.2 compressive, split tensile and flexural strength test:

The mechanical strength of different paver block test specimens was conducted in 28days, and the results are as shown in Table.

Mix	Compressive strength (MPa)	Spilt tensile strength (MPa)	Flexural strength (MPa)
CA 0% FA30%	38.6	2.98	3.01
CA 30% FA0%	38.22	3.183	3.22
CA 30% FA30%	40.03	3.25	3.85
CA 50% FA50%	43.56	3.367	3.94

4.3 WATER ABSORPTION TEST: It is one of the important parameters when considering structures' durability. The test was conducted as per IS 1124-1974. The Materials were placed in the oven. Materials were dried in the oven and it is controlled in temperature at 110ºC for 72 hours. The gap between the paver block is 25 mm to 30mm. After removal from the oven, the paver was put in an airtight container. The weight of the block was noted. Then after the materials were immersed in water for 30 hours. Then, the paver block is removed from the water tank and shaken to remove excess water. Further paver was wiped with a soft cloth to make it dry.

Sample of paver	Wet Weight	Dry Weight	Water Absorption
CA 0% FA30%	**5.498**	**5.121**	**7.36**
CA 30% FA0%	**5.398**	**5.279**	**2.20**
CA 30% FA30%	**5.456**	**5.209**	**4.71**
CA 30% FA30%	**5.432**	**5.313**	**2.23**

5. CONCLUSIONS

1. After the test results, it can be inferred that the replacement of fine aggregate and coarse aggregate by demolition waste can be recommended.
2. Blocks produced with construction and demodulation recycled aggregates presented better results in all properties. The removal of the powdery material provided greater compressive strength
3. The characteristics split tensile strength were ssatisfied.
4. Water absorption by the paving block was within permissible limit.
5. The characteristics flexural strength was satisfied.

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