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Comparative Study on C and D Waste and Industrial Waste to make M-Sand Concrete in an Aggressive Environment

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ABSTRACT

Construction and demolition (C&D) waste generation and handling issues have been in focus to achieve sustainable goals. This project comparative studies on C&D waste concrete and Industrial waste concrete in the Aggressive environment. Owing to growth in construction in India, it is appropriate to link generation of C&D waste with the growth. C&D waste in India in 2010 may be estimated as 24 million tonnes. This paper provides an overview of the construction industry in India and gives some statistics about the volume of C&D waste. The main applications of fly ash are then discussed, with particular reference to disposal as well as to civil engineering, chemical industries, agricultural, environmental and soil stabilization applications of fly ash. In future fly ash can be used as a substitute for materials and it remains a potential low-cost adsorbent for the future.

Keywords: *Construction and Demolition (C and D) Waste, Fly Ash, Low-cost.*

1. INTRODUCTION

For the purpose of this study, C&D waste is defined as the waste resulting from new construction, remodeling, or the demolition of a structure. For instance, a remodeling load might be estimated to be 60% construction and 40% demolition. On the other hand, to power our world, we burn billion of coal every year. Rather than sending the ash to landfills, some is being recycled for beneficial uses, including as an additive or key components of building products.

2. RESEARCH OBJECTIVES

The following are the objective of this study,

- C&D debris comprises more than 20% of the landfilled material.
- Discarded building materials such as brick, metal and some woods are readily reusable or recyclable.
- The wood of varying types and quality makes up 20-50% of the C&D waste stream.
- Successful processing facilities need reliable outlets for the small screened "fines" fraction of the C&D waste stream
- Recycling ordinances/requirements
- Variation in DNR permitting
- Wood Markets
- Alternative uses for C&D fines

3. MATERIAL PROPERTIES

MINERAL ADMIXTURE:

C&D WASTE

C&D materials often contain materials that include: concrete, asphalt, wood, metals, gypsum, plastics and salvaged building components. It is a challenging task to handle C&D waste because it is bulky, heavy and inert and also a mixture of various materials of different characteristics. It is also difficult to choose any suitable disposal method, for example, it cannot be

incinerated due to its high density and inertness. With the advent of sustainable practices in the construction industry, C&D waste generation and handling issues have been in focus to achieve the sustainable goals for our common future.

INDUSTRIAL WASTE

Fly ash can be used in Portland cement concrete to enhance the performance of the concrete. Portland cement is manufactured with calcium oxide (CaO), some of which is released in a free state during hydration. As much as 20 pounds of free lime is released during hydration of 100 pounds of cement. Some of the resulting benefits are: be disposed in landfills and conservation of other natural resources and materials. Typically, 15 to 30 % of the Portland cement is replaced with fly ash.

4. MATERIAL TESTING

Specific Gravity Test For Cement
Fineness Test For Cement
Specific Gravity Test For Fine Aggregate
Fineness Modulus Test For Fine Aggregate
Fineness Modulus Test For Coarse Aggregate
Specific Gravity Of Coarse Aggregate
Impact Value Of Coarse Aggregate
Tests On Concrete Cube

FRESH CONCRETE TEST PROCEDURE

Slump cone test
Compaction factor test
Flow table test

COMPRESSIVE STRENGTH OF CUBICAL SPECIMEN:

The cubes should be placed in the compression testing machine in such a manner that the smooth faces of the cube rest on the steel plates. The compression testing machine is of any reliable type, of sufficient capacity for the tests and capable of applying loads. The compression testing machine shall be equipped with two steel bearing plates with hardened faces. One of the plates (preferable the one which will normally bear on the upper surface of the specimens) is fitted with a ball seating in the form of a portion of a sphere. The other compression plate shall be plain rigid bearing block. The bearing faces of both the plates are at least is large and is preferably larger than the normal size of the specimen to which the load is to be applied.

CURING:

Curing may be different days to be conducted. 14, 28 days to be conducted for the specimen. 14 days curing specimen strength. And 28 days curing specimen compressive strength. Curing is a main factor for constructions.

AGGRESSIVE ENVIRONMENT CONCRETES:

The destruction action of aggressive waters on concrete is progressive. Whereas structures are only partially increased or in contact with aggressive soils or waters on one side only, evaporation may increases the serious concentration of salts with subsequent deterioration even where the original salt content of the soil or water is high.

Sulfate attack
Chloride attack
Acid attack
Alkali-aggregate reaction
Effect of sea water

SEA WATER ATTACK

The deterioration of concrete in sea water is often is not characterized by the expansion as found in the in concrete exposed to sulfate attack. Attack of sea water cases erosion or loss of constituents of concrete without undue expansion calcium hydroxide and calcium sulfate are considerable soluble in sea water, and this will increase the leaching action.

Mix Design For M30 Grade Concrete
Mix Proportion:

1 : 1.32 : 2.52

5. RESULTS AND DISCUSSIONS

Tests on Cubes

To obtain exact values of the parameters, a number of additional tests would have to be carried out for the material used in experiments. Cubes which are made of the same concrete that is used for shell construction are subjected to compression test after 28 days at room temperature and ultimate compressive strength of concrete is determined. Cubes were placed one after the other properly in the compression testing machine in such a way that load will be applied uniformly over the cubes. Loading was given at the rate of 2kN/sec and the readings at the failures were taken. The failure pattern is shown below and the obtained data is tabulated. There are parameters needed to describe the plastic properties of concrete. From the above results, the ultimate compressive strength of concrete is found as 40 N/mm2.

CURING AT NORMAL WATER

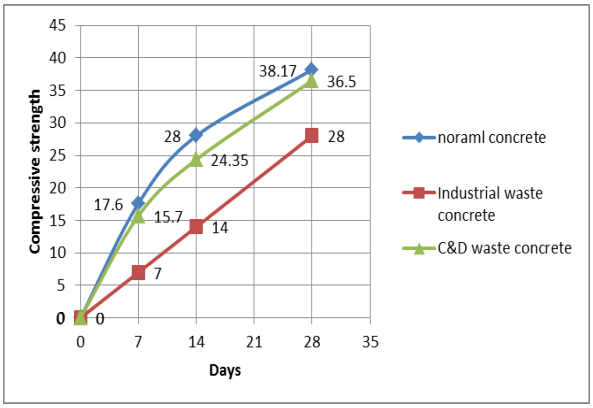
COMPRESSIVE STRENGTH	NORMAL CONCRETE	C&D WASTE	INDUSTRIAL WASTE
7 DAY **N/mm^2**	16.5	14	13.2
14 DAY **N/mm^2**	27.6	24.6	21.30
28 DAY **N/mm^2**	37.25	34.26	31.15

CURING AT SEA WATER

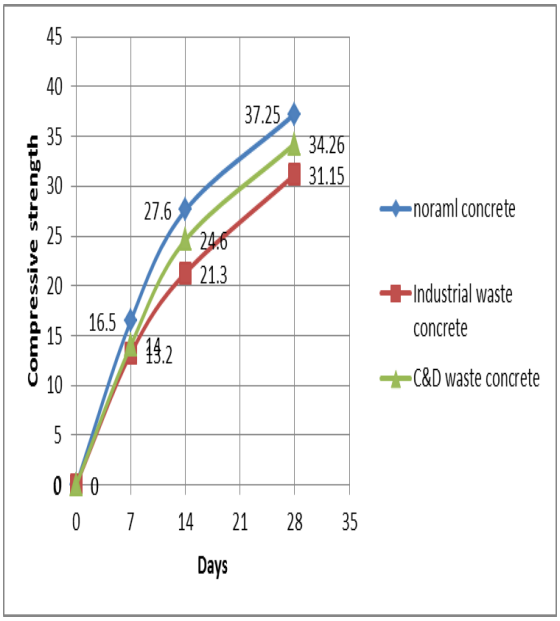
COMPRESSIVE STRENGTH	NORMAL CONCRETE	C&D WASTE	INDUSTRIAL WASTE
7 DAY **N/mm^2**	17.6	15.7	14.4
14 DAY **N/mm^2**	28	24.35	20.8
28 DAY **N/mm^2**	38.17	36.5	32.12

GRAPH:

For Normal water



In Sea Water



6. CONCLUSION

C and D waste minimization and handling are necessary for view of limited landfill space and increasing quantum of demolition waste. If measures to minimize and handle the C&D waste are not developed and efficiently adopted, it may threat environment as well as the sustainable movement of the country. This will cause an extra burden on solid waste management plans, which are already looking for new ways to fight with the growth in municipal solid waste due to increase in urban population and developments in the country. 3Rs policy and use of waste minimizing technologies e.g. design for deconstruction and reuse of materials should be adopted to minimize C&D waste. Recycling of C&D waste by converting it to aggregate may offer dual benefit of saving landfill space and reduction in the extraction of natural raw material for new construction activities, leading towards sustainable development.

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