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C & D Waste Material Management in Construction Industry of Nagpur Region

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Abstract - *C & D waste material management means utilization of the waste generated from Construction and Demolition activities by using various management techniques. Further study states the current situation of C & D waste material management in Nagpur and its future scope. In Nagpur region most of the C & D waste is managed by Reducing and Reusing techniques. As the rate of construction and demolition is moderate in Nagpur there is negligible need of recycling of C & D waste material. But as the rate of infrastructure development is increasing, in future, recycling will be a need. The recycled concrete aggregates can be used alternative to the natural aggregates and manufactured sand can also be used for alternative to natural sand. The strength of concrete mixwd designed with recycled aggregate is 10 to 15 per cent less as compared to natural aggregate concrete.*

Key Words: Construction and Demolition waste management, 3R Technique, recycled concrete aggregate.

1.INTRODUCTION

With the growing construction industry in Nagpur, waste material generation is increasing year per year. The construction and demolition waste is mostly used for land filling process in Nagpur. Waste material is mainly consisting of natural materials and costly material like sand, aggregate and cement. If the waste material is recycled and used with natural materials in some proportion then it will save cost and natural materials.

Due to the increase in the economic growth after development and redevelopment projects in the city and increase in the urbanization has made construction sector to increase rapidly, but also environmental impacts from construction and demolition (C & D) waste are rapidly becoming a major issue in city's C&D waste material management.

For the purpose of management of C&D Wastes in India, Construction and demolition waste has been defined as 'waste which arises from construction, renovation and demolition activities. Also included within the definition are surplus and damaged products and materials arising in the course of construction work or used temporarily during the course of on-site activities. The various streams of wastes to be considered will include;

- Excavated materials,
- Concrete blocks,
- Bricks,
- Dry Mortar,
- Tiles,
- Steel,
- Plastics,
  Wood, and
- Concrete rubbles, etc.

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The primary method is adopted in waste handling is carried through by Questionnaire method to professionals like project managers, civil engineers and contractors if different construction sites of Nagpur.

Secondary information is collected by compiled data from secondary source like various research papers, various international journals. Some information is collected thorough national authorities websites in construction waste and demolition management.

2. OVERVIEW OF CONSTRUCTION AND DEMOLITION WASTE MATERIAL MANAGEMENT.

It is said that there is no adequate or satisfactory data for accessing to amount of waste material generated in Nagpur. This is because there is no separate regulatory frame work for handling the construction and demolition waste management within

the city, as it is considered in the municipal solid waste management. Due to which it is getting difficult to access the information or to handle the construction and demolition waste material. As report prepared by the MoEF (Ministry of Environment and Forest) in 2008 determined that 0.53 million tones/day of waste is generated in the country. On that basis the 210 million tones of MSW is produced annually. Above information show in Nagpur the construction and demolition waste handling is taken lightly.

The composition of construction waste depend on the structure types. For example if the structure is flyover or bridge structures the composition will be usually concrete and steel. If the structures are residential buildings then the composition will be in different forms. It consists of concrete, steel, wood, tiles, bricks, plastics etc.

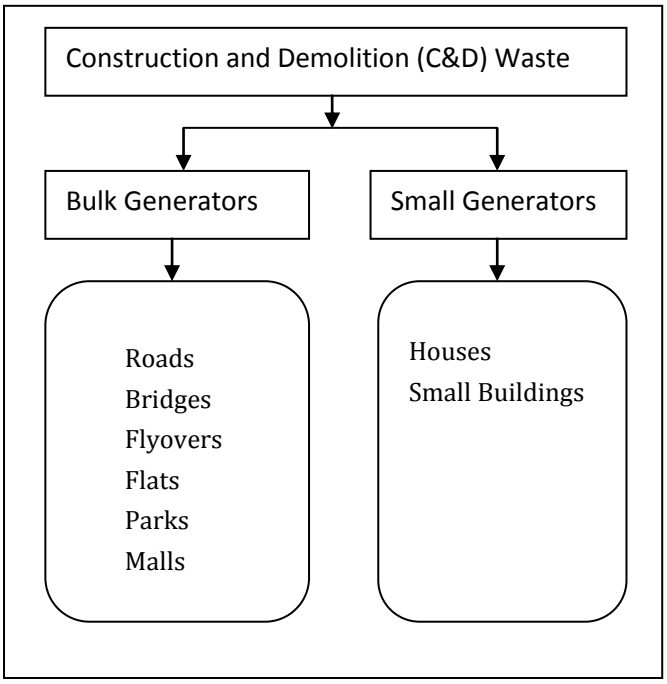

Table-1: Composition of Construction and Demolition Waste Material.

Sr. no.	Components of C &D waste	TIFAC (%)
1.	Soil/ sand/ aggregate	36.0
2.	Bitumen	2.0
3.	Steel	5.0
4.	Concrete	23.0
5.	Wood	2.0
6.	Others	1.0

Above table shows the information of Composition of Construction and Demolition waste material. It is clearly seen that soil, sand, aggregate, and Concrete contributes nearly 60% of the total waste material. Hence the natural materials and costly material cement is becoming waste and just used for land filling is a major problem. Recycling of waste material is not being implemented for waste material management of Nagpur city.

Fig -1 : Site Picture of C & D waste 1

Fig 2 : C & D waste site 1

Fig 3 : C & D waste site 3

From above pictures taken on the day of visit to various sites running in Nagpur it is seen that mainly sand, soil, aggregates, and concrete is present in waste material.

3. THE '3R' CONCEPT

Until last two decades, landfill was considered as the low cost and efficient method of C&D waste management in Nagpur. But land filling is considered to be undesirable due to environmental and ecosystem hazards. Now most of the landfills are at the end of arriving at its full capacity due to construction of basement oriented buildings. Hence, more valuable lands may have to be employed in the future, which increase cost for C&D waste disposal.

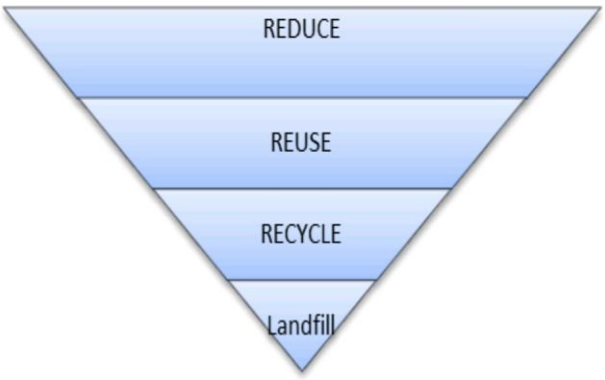

Fig - 4 : The 3R Concept

3.1 Reduce : It is process of reduction of waste generation in various stages of construction by efficient material planning. Wastage generation can be identified during the design process itself and care should be taken during execution stage to decrease the waste that may generate. Waste reduction can be achieved by design by considering adequate sizes for all required building materials. Design to be flexible and adaptable to changing uses and design for reconstruction.

3.2 Reuse: It is process of reuse of generated waste material as landfill. Reuse of generated waste material is done at same or at another site under construction. This involves identification of waste that can be segregated for reuse on the current project or another project and that can be donated. A comparison of the value of the materials "as it is" for salvage and to their value as materials for recycling may be considered prior to reuse in most of the cases. Some of these materials may be valuable to reuse on-site during construction work; others may be sold to be used building material in another site.

3.3 Recycle: The process of converting waste material to usable construction material replacing the natural materials in some proportion is called Recycling process. After adopting all the options to prevent waste, salvage and reuse materials, the next step is to recycle as much of the remaining waste material as possible. Recycling saves money by minimizing disposal costs and replacing fresh materials at some extent.

The material which are obtained after recycling of waste materials can be used with natural materials to make concrete and also Manufactured sand with the natural sand in cement mortar. According to *Tomas U. Ganiron Jr* "The strength of concrete mixed designed with recycled aggregate is 10 to 15 per cent less as compared to natural aggregate concrete". Therefore an initial step for reducing rock mining can be taken in the city as environment saving agenda.

3.3.1 Recycling Concrete Debris from Construction and Demolition Waste

Usually demolished concrete were shipped to landfills for disposal, but due to greater environmental awareness, the concrete is to be recycled for reuse in concrete works. There are many benefits in recycling concrete other than the common process of land filling.. The benefits of recycling of concrete are (a) Local product – local sources. (b) Reduces truck traffic. (c) Alternative to a non-renewable resource. (d) Cost savings. (e) No disposal fees. (f) Reduces rock mining.. Using recycled material as aggregate reduces the need for gravel mining. There are also economic benefits. Recycled concrete is a construction material that the community does not need to pay for; those who generated the concrete waste pay a fee to have it recycled. The strength of recycled aggregate concrete is less as compared to concrete with fresh aggregate. Reliable results can be obtained by proper suitable mix designs. The mix requires slightly higher quantity of cement or using admixtures to reduce water requirement. Recycled aggregate concrete can be safely used as plain concrete. With proper corrections in mix design, it can be used for R.C.C. works also.

4. CONCLUSIONS

It has been seen that the C & D waste material are being reused in new construction for land filling. As the moderate rate of construction and demolition activities C & D waste management plant, at present, is not

required in Nagpur. In future there would be need of C & D waste management plant in the city. Recycled concrete aggregates can be used replacing fresh aggregates. Well planned and efficient waste material management leads to cost saving and better environment.

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