

RESEARCH ARTICLE

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Assessment of Reutilization of Various Categorical Waste from Construction Site

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ABSTRACT

Construction and demolition waste is one of the important category of solid waste. Many recreational and building projects contribute towards generation of ample quantity of waste produced on these respective sites. Reutilisation of the construction and demolition waste can be very beneficial in terms of various managing and operational parameters on a construction site. This paper emphasises upon study of assessment of reutilization of various categorical waste from constructional site situated at different geographical areas. Numerous types of waste generated from these respective sites are taken into consideration and their reutilisation on the same site is focussed which resulted in reducing cost, labour work and wastage of the materials. By-product formation from the reutilisation of waste generated from these types of constructional arena is being focussed upon. Further recommendations in terms of the future scope of the study are given at the end of the paper.

KeyWords: Construction Anddemolition Waste, Recyclable Materials

I. INTRODUCTION

Construction and Demolition (C&D) Waste is defined by the U.S Environmental Protection Agency (EPA) as construction and demolition (C&D) materials that consist of the debris generated during construction, renovation and demolition of buildings, roads, and bridges. Bulky, heavy material like concrete, wood, metals, glass, and salvaged building components, usually, constitutes C&D waste. Each material of the construction and demolition waste stream is handled and processed differently [1]. The composition of the C&D waste stream is dependent on various factors such as type of structure, location of the project, materials used, process of demolition, construction waste management plan, etc.

The waste created needs to be carefully managed to minimize their effect on health of living beings and the health of planet, earth. A quick review of the 5 R's of managing waste (three that have been around for years, plus two newer ones) is presented, here. Reusing means getting the most out of things in their original form before you toss or recycle them. One can reuse things oneself or pass them along to someone who can further reuse them. Reusing is simple once you get into the habit, like writing a shopping list on an opened envelope or the back of office paper rather than on a brand new sheet. Plastic bags (both large white bags and clear produce bags) can be reused several times before they are recycled.

Recycling is the R that has caught on the best. However, recycling is not always as easy as one would like it to be. Recycling, like using cans to make new cans is better than throwing them into the

landfill but it still takes energy to collect, crush and remake them. Therefore, it is advisable to recycle after multiple reuses. Rejecting is one of the newer R's. Some people also call it pre-cycling. In terms of smart waste management, this is the simple act of rejecting excessive or unnecessary packaging. The next 'R' that indicates respond goes by several different names, but they all come down to one thing, i.e. letting manufacturers and businesses know your opinion about their waste management practices; one can contact them to voice concerns about excessive packaging or else, even appreciate when they are doing something positive for the Earth. Reducing means producing less waste so that you throw away less trash and garbage into landfills. Reducing is the most effective way to manage waste that can be started at any random point.

The objective to carry out this study is to identify the types and amount of waste generated at construction sites. In addition to it, this paper aims to analyze the procedure followed to manage the waste generated at construction site along with the cost involved in waste management. Suggestions/Methods to reuse the construction site waste are also hinted upon. In the name of development, construction sites are visible in plenty in urban areas wherein it is often observed that the construction waste are scattered all around its premises, harming the nature and population around alarmingly. Through proper waste management techniques, living creatures and earth as a whole can be better maintained

II. METHODOLOGY

In this investigation, two locations were selected from where the surveys were performed to assess the types and amount of waste generated. In the first survey site at Times Residency in Golf Course Extension Road, Gurgaon, it was noted that 600 flats were under construction and area of each flat was 1440 sq. ft. It was found that a large amount of construction waste was generated and they were recycled at the site itself. Specifically, an assessment of inert waste for a specific zone of constructional area was done in this site along with the outcome of the inert waste. At the second site in a residential unit, survey was carried out at a renovation site of a bedroom and washroom. The area of the bedroom was 230 sq. ft. and that of the washroom under construction was 100 sq. ft. An assessment was taken of the amount of various types of construction waste generated in the area and the management of the waste generated thereof. These surveys included interaction with the Head and labour of the respective construction sites and collection of data relevant to the types of C&D waste and procedure to manage it. This exercise helped in identification of the proportion and types of inert waste generated at a

construction site. Further, the utility of the inert waste generated and the cost involved was investigated along with the methods that can be adapted for an eco-friendly and economic waste management.

III. RESULTS & DISCUSSIONS

In the first survey site, the construction waste that were collected was reused and recycled at the site itself. At this site, amount of inert waste generated in a specific zone were examined. The type and amount of waste generated was assessed. Further to it, the amount of waste that could be recycled at the site and be reused in construction was also estimated (Table 1). A mixture of the different inert waste generated were taken from the construction site. In proper proportion, the various types of waste were taken to make concrete blocks. Usually, these concrete blocks were hollow from inside and they were stacked one on top of the other with fresh concrete mortar to form desired wall. At this site, this recycled product was reused in some portions of the construction project.

Table 1: Amount of Waste Generated and reused in a Construction Site

S. No.	Type of Waste	Unit of Waste	Amount of Existing	Amount of Recycled	Amount of Waste
1.	Marble	Square Feet	120.00	115.00	5.00
2.	Brick & Mortar	Square Feet	500.00	490.00	10.00
3.	Glass	Square Feet	25.00	-	25.00
4.	Iron/Steel	Kilograms	750.00	747.00	3.00
5.	Wood	Square Feet	400.00	394.00	6.00
6.	POP	Bags	150.00	130.00	20.00
7.	Wall Putty	Kilograms	75.00	-	75.00
8.	Core Sand	Kilograms	550.00	540.00	10.00
9.	Electrical Components	Square Feet	50.00	-	50.00
10.	Tile	Square Feet	100.00	80.00	20.0
11.	Water Pipes	Running Feet	250.00	248.00	2.0

From Table 1, it can be said that majority of the waste generated at a construction site of an area which is 150 sq. ft. could be processed and reutilized at the same site for making concrete blocks (Fig. 1).

These concrete blocks were used in the making of walls in some portions of the same construction site (Fig. 2).



Fig. 1: Concrete Block from recycled inert waste



Fig. 2: Wall made from Concrete Blocks generated from Recycled Inert Waste

At the second site, which was a renovation site, amount of waste that was demolished for renovation was quite huge. An assessment was done to find out the types of waste generated. The bedroom and the washroom, undergoing renovation was respectively of areas 230 sq. ft. and 100 sq. ft. respectively. In the bedroom area, the types of waste

found were marble, glass, brick and mortar, iron/steel, POP, wall putty, fallen ash and electrical items. An estimation was taken for each type of the waste generated. Some of this waste underwent proper processing, i.e. got recycled so that they could be reused in the same site. An assessment of the waste generated, waste reused as well as unused is shown in Fig. 3 for the bedroom renovation site.

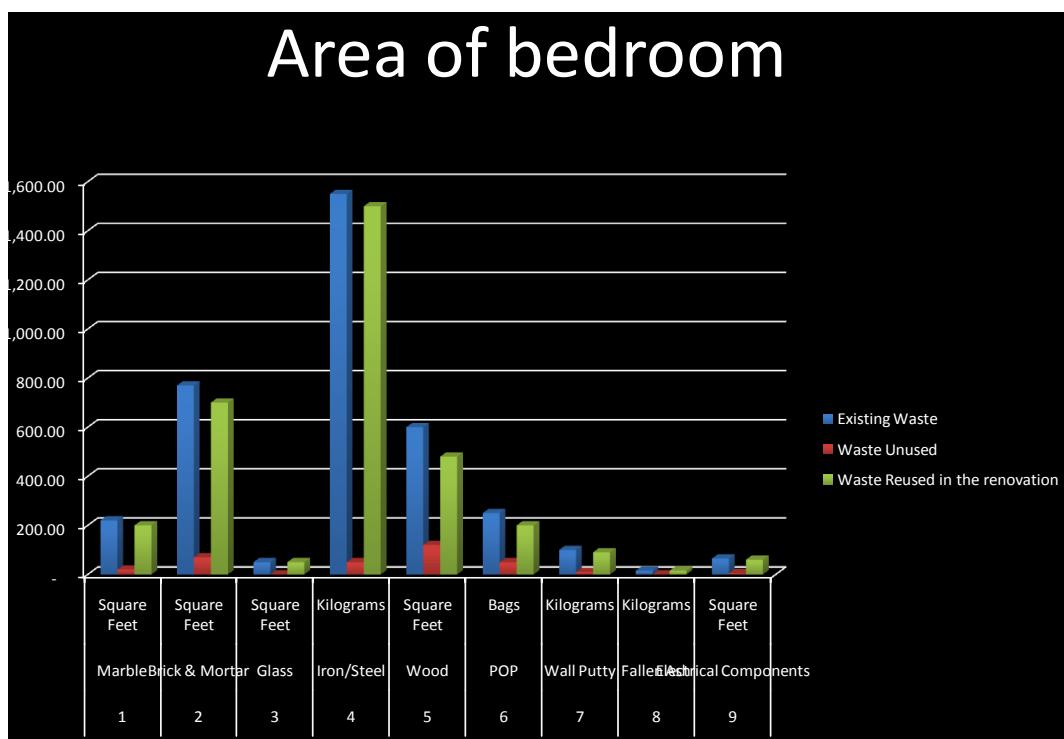


Fig.3: Assessment of Waste Generated in the bedroom area of the Renovation Site

In addition to the types of waste generated for the bedroom, the other types of waste generated for the washroom were water pipes, bath tubs, faucets and hand basins. Based on their usage condition, all

these items, specially mentioned for the washroom can be reused or needs to be replaced. In Fig. 4, the types and amount of waste generated, reused and unused for the washroom are shown.

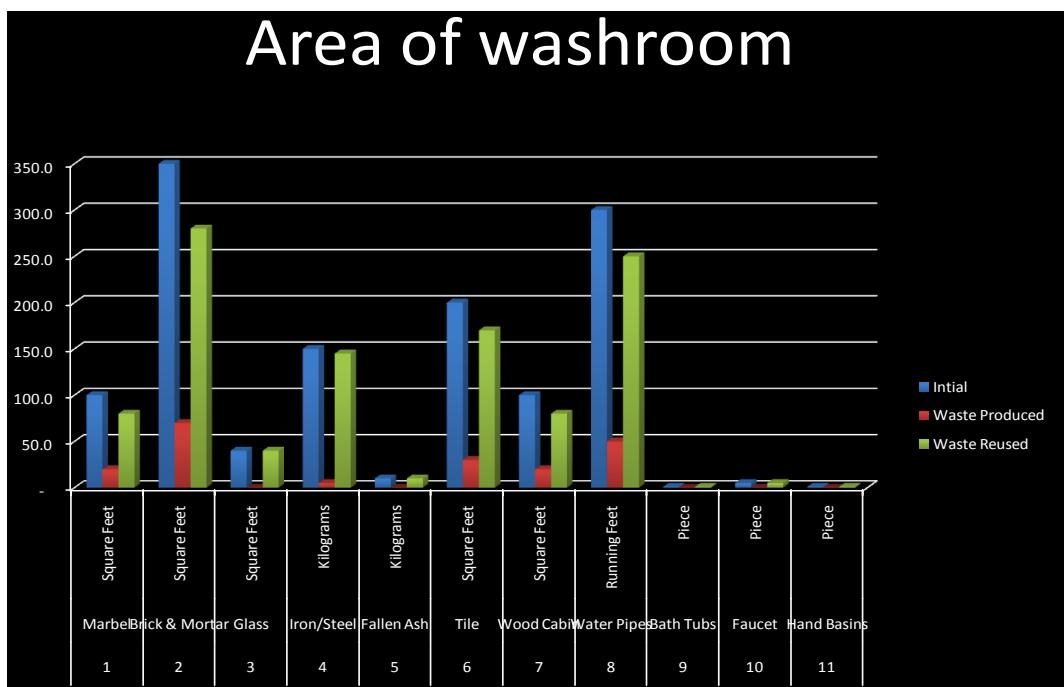


Fig. 4: Assessment of Waste Generated in the washroom area of the Renovation Site

From Fig. 3 and Fig. 4, it can be seen that majority of the waste generated could be reused at the site after processing. By recycling and reusing the waste generated at the site, amount of money that could be saved amounted to about Rs. 36,000 at this second survey site. Moreover, the burden on earth by simply dumping the inert waste in a landfill could be avoided.

This process of recycling and reusing the waste material is termed as cradle-to-cradle approach [2], which is an eco-efficient way. Just like planet earth that has followed a mechanism of recycle to sustain itself for billions of years, human beings can also mimic the rules of the biosphere to manage the huge amount of waste generated by the civilizations [3]. Various kinds of other inert waste are there that can be recycled to make different products. Rubber from tyres has been processed and reutilized to make tyres or fuel [4]. Metallurgical dust, foundry sands, galvanic glass microspheres were recycled to generate environmentally friendly construction materials [5]. Glass has been reused to make mortar [6] and pavement base/sub-base material [7]. Construction waste can be reused to make concrete [8] or even clay products [9]. Construction site waste can also be reutilized for making Designer Bricks that adds an aesthetic value to an individual's personal wall or even to a public stage show [10]. Moreover the investigations carried out at the construction sites in Delhi-NCR further indicate the possibility of reusing the inert waste and thus, taking a step towards sustainable development in Indian context.

IV. CONCLUSION

During the course of this investigation, the possibility of reusing the inert waste has been studied. The investigation revealed the various types of inert waste that can be generated at a construction site. An assessment was also done to approximate the amount of waste that can be recycled and reused at a construction site. This indicated that on reusing the waste there are various benefits. Firstly, the cost of purchasing new material can be reduced, thus, complying with one 'R' of the 3R waste management principle. Secondly, the landfills meant for dumping the inert waste would not be used up extensively, thus, saving on the cost of transportation and disposal of the waste. Consequently, the environment would be saved from unnecessary dumping of inert waste. By recycling and reusing the construction site waste, material cost can be minimized followed by saving resources.

Future Scope Of The Study: If in future the procedure of reuse and recycle were adapted for the inert waste at construction site, the society and the environment at large would be benefitted. It has been observed that all these C&D waste can be utilized in the making of Designer brick, 3D tile and blocks. Overall, such a practice of reutilization of inert waste would facilitate reduction of cost, labour work and wastage of materials.

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