New Approach for Using C&D Waste

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ABSTRACT
Concern over construction and demolition (C&D) waste is becoming a prevalent part of any construction project. Historically, landfilling waste materials was the standard solution for most contractors, but as tipping fees have risen dramatically over the past five to seven years, many contractors are looking for alternative methods such as recycling or waste minimization, to reduce waste. C&D waste proposes to address the problem of assessing waste disposal techniques efficiently and economically. A brief history of C&D waste is provided to understand how and why costs associated with waste materials have risen over the last several years. Current waste management resources are discussed to demonstrate the availability of alternative disposal methods. An overall waste management plan is developed to provide a contractor with a step by step flow chart for analyzing material wastes, quantitatively assessing all cost associated with waste disposal, and implementing and updating the chosen waste management techniques.

INTRODUCTION
The purpose of this report is to characterize the quantity and composition of building-related construction and demolition (C&D) debris generated in the United States, and to summarize the waste management practices for this waste stream. C&D debris is produced when new structures are built and when existing structures are renovated or demolished. Structures include all residential and non-residential buildings as well as public works projects, such as streets and highways, bridges, piers, and dams. Many state definitions of C&D debris also include trees, stumps, earth, and rock from the clearing of construction sites. The focus is on building-related wastes, including construction, demolition, and renovation of residential and non-residential buildings.

WASTE GENERATION IN CONSTRUCTION INDUSTRY
All over the world, the growth of construction industry is enormous in the past decade. The pace of generation of C&D waste is also significant. In general, there are two sources for generation of waste materials, namely, bulk generators and retail or small generators. The classification of sources is given in Fig 1. The infrastructure development sector and real estate sector are the bulk generators of waste. The contributors of C&D waste in a project are given in Fig 2. The project activities are to be planned at every stage by every personnel, who are involved, to minimize the overall waste generation.

PRESENT PRACTICES OF WASTE DISPOSAL
The common treatment methods of C&D waste are given in Fig 3. Among the various approaches, the manual separation is highly efficient.
labour oriented and the mechanical separation requires costly installations. The present waste handling practices adopted by the construction industry in India at different levels [4] are:

- Items recovered during construction / demolition is sold in the market at a discount rates.
- The feasibility of recycling. Items that cannot be re-used are used for filling the land.
- Landfill tax is not imposed by municipality.
- Waste is disposed without segregation.
- No penal action is taken against violators.

The industry is not aware about the possibilities of cost savings from proper handling of C&D waste. In fact, higher construction productivity, save in time and cost can be achieved by proper implantation of C&D waste management system [5].

NEW METHOD FOR C&D WASTE MANAGEMENT

In India 50% of C&D waste is used for land filling Purpose at present. Which may be reused in construction after segregation process. By Crushing the construction and demolition waste to powder and being used as alternative material in construction. It may become familiar only when there is no place to fill, dispose the c and d waste.

THE ’3R’ CONCEPT

Until last two decades, landfill was considered as the cheapest and convenient method of C&D waste disposal. But land filling is considered to be undesirable due to environmental and ecosystem hazards. Now most of the landfills are at the verge of arriving at its full capacity. Hence, more valuable lands may have to be employed in the future, which increase cost for C&D waste disposal [6].

Fig.3 C&D waste treatment methods

Reduce
Potential wastes can be identified early in the design process itself and measures should be taken during to minimize the waste. The reduction can be achieved by design with standard sizes for all building materials, design spaces to be flexible and adaptable to changing uses and design for deconstruction.

Reuse
This involves identification of waste that can be salvaged for reuse on the current project or another project. 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 many cases.

Recycle
After adopting all the options to prevent waste, salvage and reuse materials, the next step is to recycle as much of the remaining debris as possible. Recycling saves money by minimizing disposal costs. The Recycled and Reuse of Construction Materials such as:

<table>
<thead>
<tr>
<th>Material</th>
<th>Origin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete</td>
<td>Concrete is the primary material for larger buildings in foundations, retaining walls, roofs and floor construction &amp; used in pavement on roads.</td>
</tr>
<tr>
<td>Normal concrete, steel reinforced concrete, concrete brick, waste concrete.</td>
<td>Concrete is produced from cement (binder), aggregate, water and additives, when required. It is cast on site in shuttering, or as blocks or concrete elements.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Work of Collection</th>
<th>Reuse</th>
<th>Collection of prefabricated sections and blocks requires careful dismantling of a building.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market</td>
<td>Recycling</td>
<td>The market for recycled concrete is primarily in road construction as underlay's and drainage material. Recycled concrete could be used as aggregate in new concrete and progress has been made towards the normalization of this process.</td>
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<tr>
<td></td>
<td>Sorting</td>
<td>Example of central sorting process</td>
</tr>
</tbody>
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<thead>
<tr>
<th>Recycling process</th>
<th>Jack hammering and crushing in-situ, separation from steel components manually by crusher and magnetic separation.</th>
</tr>
</thead>
</table>
Technologies

For Example:
Concrete crusher “RUBBLEMASTER”

“RM60 - The FLEXIBLE ENTRANCE MODEL, the crane-lift mobile RM60 produces 80 tons/h of granular material from building debris, bitumen or Concrete. Supplementary pre- and post sorting modules is integrated for a complete recycling system.”

Roller screens
The Minerals roller screens are used to separate on-size particles from the oversize and undersize fractions.

Wobbler feeders/scalpers
The unique action of a wobbler feeder provides feeding and scalping of materials in a single machine. Even wet, sticky materials can often be handled due to the specially designed self-cleaning, non-clogging elliptical bars.

Market/Products

<table>
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<th>Material</th>
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</thead>
<tbody>
<tr>
<td>RC-Frost protection material</td>
<td>Base/Filter layer under surface or between foundation slabs</td>
</tr>
<tr>
<td>RC Concrete - SPLITT</td>
<td>Self hardening Paving</td>
</tr>
<tr>
<td>RC Concrete - SPLITT</td>
<td>Reinforcing of road and walkways, loose top coat</td>
</tr>
<tr>
<td>RC Concrete – SCHOTTER</td>
<td>Drainage layer and basement wall protection</td>
</tr>
</tbody>
</table>

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</thead>
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<tr>
<td>Brick</td>
<td>Standard Bricks Clay, sand and light mineral materials are wet mixed, formed, and kiln fired.</td>
</tr>
<tr>
<td>Bricks can also be re-used as bricks directly bricks. Mostly 45% of bricks are used for weathering course.</td>
<td></td>
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</tbody>
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<table>
<thead>
<tr>
<th>Ways of collection</th>
<th>Ways of sorting</th>
<th>Reuse</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual dismantling, cleaning and stacking</td>
<td>Manual in-situ</td>
<td>Cleaning and separation from mortar</td>
</tr>
</tbody>
</table>

Technologies
Saws, grinders, mortar grinders
Mainly care and restoration of monument class buildings

Ways of collection
Brick rubble is lifted by sieve shovels with excavators, thus partial sorting is possible during collection.

Ways of sorting
Rubble bucket lifting, sieving, magnetic separation

Recycling Process
Crushing and sorting according to kernel size, separation from metal components

Market/Products
Road base and construction fill

Material
Wood, Timber

Origin
Timber has been the main structural and covering material in the county all over the world. In roof construction, its light weight and structural properties have made it more attractive. It can be used to cover roofs as shakes, shingles or planks. The sheeting is produced as fiberboard, cork, chipboard or veneer.

Recycling
Considerable quantities of reusable timber can be recovered during the demolition of old buildings.

Ways of collection
Collection of wood for direct reuse is largely done manually, with the aid of powered hand tools.

Ways of sorting
Reusable wood is sorted by type, size and quality

Market
Larger pieces of the highest quality recovered wood, such as barn boards and structural timbers are used intact. They are largely used by the woodworking industry as raw material for furniture flooring.

RECYCLING
Wood to be recycled can be collected alone from a site or mixed with other C&D wastes.

Market

CONCLUSION
The exploitation of potential resources from construction and demolition (C&D) wastes is yet another opportunity and future profession in the construction industry in India. Waste minimization and waste management programs are in its infancy in India. It is possible to minimize the volume of C&D waste generated by identifying the potential waste early in the design. But even with proper resource-efficient design and by adopting proper construction and deconstruction procedure, some waste may essentially be generated in every project.

REFERENCE