GREEN CONSTRUCTION: MANAGING CONSTRUCTION WASTE IN INDIA

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Abstract:

Construction waste (CW) is any matter or thing which is perceived as useless and is generated as a result of construction work, demolitions, renovations, excavation and excess unused material which is abandoned. This construction waste is piled and in a in a time period settles to become mounds with vegetation and a becoming home to reptiles and other bacteria.

Over 90% of construction waste are inert and are known as public fill. Public fill includes debris, rubble, soil and concrete which is suitable for land reclamation and site formation. Disposal of public fill at public filling areas and mixed construction waste at sorting facilities or landfills has been the major approach for construction waste management. However, a well planned supply chain does not exist for the public fill. There is no database as to where the land profile needs filling and where it is not required. The logistics and transportation cost from source of construction waste to the public fill area is also important. Re-handling of construction waste adds to the labor and handling costs. The waste is many times not properly sorted. The non-inert materials in construction waste which include bamboo, timber, vegetation, plaster of Paris, glass, packaging waste and other organic materials cannot be used for public fills. These non-inert materials need to be recycled or reused. This paper discusses the pragmatic issues concerning the construction waste management system.

1. THE PROBLEM

For sustainable development, inert construction waste need to be reduced or properly disposed. It is observed and many times that the construction waste is dumped in some open space away from the city or near some water streams or river or some low lying areas. There is no scientific reason for the dumping but only convenience to just get rid of the waste. This causes blockages for the rain water or running stream. Many times, the place where such construction waste is dumped is again excavated adding to cost and further pollution.

2. MANAGEMENT STRATEGY FOR CONSTRUCTION WASTE

The construction waste management strategy in India needs to be reviewed pragmatically. The system is summarized as an inverted cone which is to avoid, minimise, reuse, recycle and finally dispose of waste with the desirability decreasing in this order.

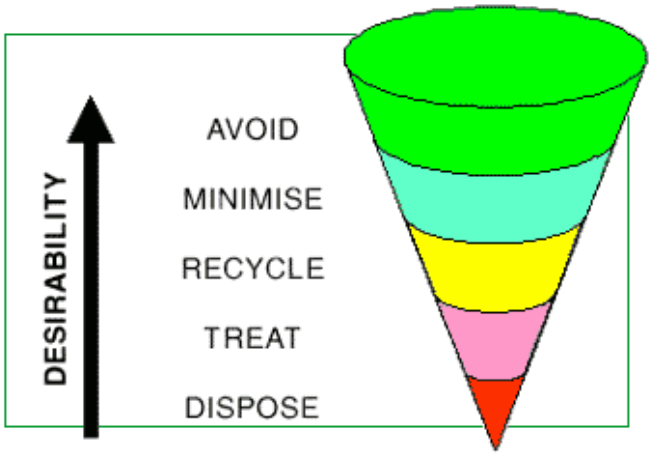

Fig. 1. Construction waste Management Cone strategy

The priority cone suggests that far as possible we need to reduce the generation of construction waste and to maximize reuse and recycling of the waste. The hard cement waste can be compounded to make bricks or used for filling and the steel can be used for construction. The last resort is the disposing of the waste. For the construction waste Management system, we need the following:

- Operate well-managed public filling programme with sufficient public fill reception facilities and counters giving details of locations where the filling is required.
- Sorting of inert and non-inert construction waste and encourage sorting of mixed construction waste into steel, solid cement waste, coated bricks, and concrete.
- Encourage reuse and recycling of construction waste.
- Avoid and minimize construction waste through better design and construction management.

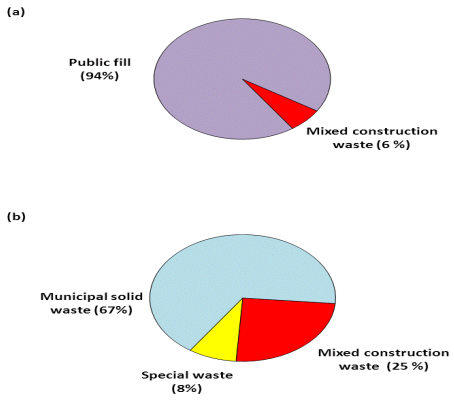

Fig. 2. Statistics of approximate waste generation

3. PLANNING FOR CONSTRUCTION WASTE REDUCTION (CWR)

Before embarking on the construction activity, proper planning for waste reduction should be carried out. It can be achieved by preparing a Waste Management Plan to identify key waste types, set out waste reduction programmes and targets, and also arrange on-site sorting and proper waste disposal. Many times, a spontaneous generation of waste gets a spontaneous disposal solution creating chaos and adding to cost. The following are some of the important aspects which can be considered for planning for waste reduction.

a) Lean Construction

Adoption of lean construction such as using thinner internal walls and floor slabs and reducing foundation size could minimise the amount of raw material being used and thus reduce the amount of waste.

b) Cut and Fill economics

For foundation works and earth projects, design for reusing excavated spoils as back-fill material to balance cut and fill could reduce the generation of excavated spoils.

c) Modular Designs and Precasting of Building Components

Modular building designs enhance precasting of building components such as facades, staircases and semi-precast floor slabs. Off-site prefabrication can reduce cut-off wastage and the use of moulds on-site.

c) Designs for Long-Life, Reuse and Recycle

Construction designs should be flexible to include opportunities for future adaptation of buildings. Reuse of CW such as bricks and tiles and recyclable materials such as metals instead of timber should also be encouraged.

d) Selective Demolition

Building demolition should be planned and designed. Should there be a hand demolition or dismantelling or is there a need for a bull dozer? To maximise recovery of reusable and recyclable materials explosives should be avoided in the first go.

e) Material Utilization

Mishandling of raw materials and improper operation procedures are often causes for high raw material wastage. Raw materials should be fully utilized to avoid wastage. As such, current operation procedures should be reviewed to include any waste reduction measure, while raw

materials should be carefully used, especially during installation and cutting. Besides, broken items or offcuts should be considered for sections when small lengths are required.

f) Reuse and Recycling

Reuse and recycling could divert construction waste from waste stream back to the construction cycle. Demolition waste can also be reused and recycled on-site in new construction as bricks and tiles in new fixtures. Besides, on-site crushing of concrete could also enhance use of recycled aggregates in new buildings.

g) On-Site Sorting

On site sorting is important to recover waste for reuse and recycle. A specific area should be allocated for on-site sorting of waste while suitable containers should be provided to temporary store the sorted materials such as metals, concrete, timber, plastics, glass, excavated spoils, bricks and tiles. If small area of the site limits detailed sorting, waste material should at least be separated into inert and non-inert portions.

h) Orderly Disposal

Prior to disposal, all materials should be sorted and reused on-site or off-site while recyclable materials should be collected for recyclers' reuse. Public fill waste should be either transported to the nearest identified site or to the stockpile location. The reception facilities at the stock pile will stock the waste to be used later for other filling requirements at a charge.

4. EDUCATION AND TRAINING

Suitable education and training could increase operators' awareness on waste reduction. Site workers are encouraged to attend waste reduction seminars and workshops such as those organized by the Institution of Engineers or Engineering departments of Engineering Colleges or Vendors and Manufacturers sponsored programs. Site engineers should discuss waste handling requirements with contractors and workers prior to beginning a project. They should also post easy to read signs and provide written information about the waste reduction programme. A little application of Total Quality Management concepts and Kaizen can go a long way in effective CW management.

Conclusion:

A scientific way of waste management on construction site can reduce the construction cost and add to the better management of pollution. Storage of raw materials and construction waste can add to the systematic design of construction activity. Handling and re-handling of waste can be avoided by implementing strategic planes for CW management. This will in general contribute to 'Green Construction'.

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