

# **CHAPTER 4**

## **CONSTRUCTION AND DEMOLITION WASTE**

### **4.1 INTRODUCTION**

Construction and demolition waste is generated whenever any construction/demolition activity takes place, such as, building roads, bridges, fly over, subway, remodelling etc. It consists mostly of inert and non-biodegradable material such as concrete, plaster, metal, wood, plastics etc. A part of this waste comes to the municipal stream.

These wastes are heavy, having high density, often bulky and occupy considerable storage space either on the road or communal waste bin/container. It is not uncommon to see huge piles of such waste, which is heavy as well, stacked on roads especially in large projects, resulting in traffic congestion and disruption. Waste from small generators like individual house construction or demolition, find its way into the nearby municipal bin/vat/waste storage depots, making the municipal waste heavy and degrading its quality for further treatment like composting or energy recovery. Often it finds its way into surface drains, choking them. It constitutes about 10-20 % of the municipal solid waste (excluding large construction projects).

It is estimated that the construction industry in India generates about 10-12 million tons of waste annually. Projections for building material requirement of the housing sector indicate a shortage of aggregates to the extent of about 55,000 million cu.m. An additional 750 million cu.m. aggregates would be required for achieving the targets of the road sector. Recycling of aggregate material from construction and demolition waste may reduce the demand-supply gap in both these sectors.

While retrievable items such as bricks, wood, metal, tiles are recycled, the concrete and masonry waste, accounting for more than 50% of the waste from construction and demolition activities, are not being currently recycled in India. Recycling of concrete and masonry waste is, however, being done abroad in countries like U.K., USA, France, Denmark, Germany and Japan.

Concrete and masonry waste can be recycled by sorting, crushing and sieving into recycled aggregate. This recycled aggregate can be used to make concrete for road construction and building material. Work on recycling of aggregates has been done at Central Building Research Institute (CBRI), Roorkee, and Central Road Research Institute (CRRI), New Delhi.

The study report stresses the importance of recycling construction waste, creating awareness about the problem of waste management and the availability of technologies for recycling.

According to a study commissioned by Technology Information, Forecasting and Assessment Council(TIFAC), 70% of the construction industry is not aware of recycling techniques. The study recommends establishment of quality standards for recycled aggregate materials and recycled aggregate concrete. This would help in setting up a target product quality for producers and assure the user of a minimum quality requirement, thus encouraging him to use it.

## **4.2 CHARACTERISTICS**

This category of waste is complex due to the different types of building materials being used but in general may comprise the following materials :

### **Major components**

- Cement concrete
- Bricks
- Cement plaster
- Steel (from RCC, door/window frames, roofing support, railings of staircase etc.)
- Rubble
- Stone (marble, granite, sand stone)
- Timber/wood (especially demolition of old buildings)

### **Minor components**

- Conduits (iron, plastic)
- Pipes (GI, iron, plastic)

- Electrical fixtures (copper/aluminium wiring, wooden baton, bakelite/plastic switches, wire insulation)
- Panels (wooden, laminated)
- Others (glazed tiles, glass panes)

#### **4.3 STORAGE OF CONSTRUCTION AND DEMOLITION WASTE**

These wastes are best stored at source, i.e., at the point of generation. If they are scattered around or thrown on the road, they not only cause obstruction to traffic but also add to the workload of the local body. All attempts should be made to stick to the following measures:

- All construction/demolition waste should be stored within the site itself. A proper screen should be provided so that the waste does not get scattered and does not become an eyesore.
- Attempts should be made to keep the waste segregated into different heaps as far as possible so that their further gradation and reuse is facilitated.
- Material, which can be reused at the same site for the purpose of construction, levelling, making road/pavement etc. should also be kept in separate heaps from those, which are to be sold or landfilled.
- The local body or a private company may arrange to provide appropriate number of skip containers/trolleys on hire which may be parked at the site and removed with skip lifters or tractors as the case may be.
- Whenever a new streamlined system is introduced in a municipality, the local body may consider using its old vehicles, especially, tractors and trailers or old lorries or tippers for this purpose.
- For large projects involving construction of bridges, flyovers, subways etc., special provision should be made for storage of waste material. Depending on the storage capacity, movement of the waste has to be planned accordingly. Otherwise, it would result in job constraint as well as traffic bottlenecks.
- This subject is often neglected in case of repair/maintenance of roads, water pipes, underground telephone and electric cables etc. It is not uncommon to see that after such work, the waste remains piled for months on the roads or pavements. The concerned departments and contractors must co-ordinate with the municipality for removal of the debris generated. The municipality while giving permission for such work should clearly sort out the issue of removal of the debris and should insist that immediately after the job is over, the road should be repaired and brought back to its normal shape.

#### **4.4 COLLECTION AND TRANSPORTATION**

If the construction debris is stored in skips, then skip lifters fitted with hydraulic hoist system should be used for efficient and prompt removal. In case, trailers are used, then tractors may remove these. For handling very large volumes, front-end loaders in combination with sturdy tipper trucks may be used so that the time taken for loading and unloading is kept to the minimum.

For small generators of construction debris, e.g., petty repair/maintenance job, there may be two options – (i) specific places for such dumping by the local body and (ii) removal on payment basis.

In case of small towns where skips and tipping trailers are not available, manual loading and unloading should be permitted.

Close co-ordination between the Sanitary Department, Municipal Engineering Department and Town Planning Department is essential if there is no consolidated Solid Waste Management Department to take care of the construction and demolition waste in addition to other municipal garbage.

#### **4.5 RECYCLING AND REUSE**

The use of these materials basically depends on their separation and condition of the separated material. A majority of these materials are durable and therefore, have a high potential of reuse. It would, however, be desirable to have quality standards for the recycled materials. Construction and demolition waste can be used in the following manner:

- Reuse (at site) of bricks, stone slabs, timber, conduits, piping railings etc. to the extent possible and depending upon their condition.
- Sale / auction of material which can not be used at the site due to design constraint or change in design.
- Plastics, broken glass, scrap metal etc. can be used by recycling industries.
- Rubble, brick bats, broken plaster/concrete pieces etc. can be used for building activity, such as, leveling, under coat of lanes where the traffic does not constitute of heavy moving loads.
- Larger unusable pieces can be sent for filling up low-lying areas.
- Fine material, such as, sand, dust etc. can be used as cover material over sanitary landfill.

Metropolitan and mega cities usually generate huge quantities of wastes because of large-scale building and other developmental activities. They may identify suitable sites where such waste can be temporarily stored and some physical treatment can be carried out. These sites may have the following features:

- Compared to the general waste treatment/disposal/landfill site such sites may be suitably located near the municipal boundaries, because the inert waste do not cause odour or pollution, provided adequate steps are taken to reduce dust and noise during handling. Since these wastes are heavy, their transportation cost can also be reduced to some extent if the distance to be carried is less.
- At this site, different kinds of waste should be kept in separate heaps.
- Arrangement for size grading can also be planned so that reuse is facilitated. This can be simply done by erecting sturdy metallic screens of different sizes at an angle and putting the waste over them with the help of a front-end loader.
- The graded material should be kept in separate heaps with appropriate label and direction.
- Sale or auction of these materials can also be planned from time to time.

#### **4.6 DISPOSAL**

Being predominantly inert in nature, construction and demolition waste does not create chemical or biochemical pollution. Hence maximum effort should be made to reuse and recycle them as indicated above (4.5). The material can be used for filling/leveling of low-lying areas. In the industrialised countries, special landfills are sometimes created for inert waste, which are normally located in abandoned mines and quarries. The same can be attempted in our country also for cities, which are located near open mining quarries or mines where normally sand is used as the filling material. However, proper sampling of the material for its physical and chemical characteristics has to be done for evaluating its use under the given circumstances.

#### **4.7 PLANNING AND MANAGEMENT ASPECTS**

The concerned civic authorities should make a plan for gainful use of construction debris. The low lying areas, which need to be filled up for the purpose of building activity, may be mapped and a contingency plan prepared so that whenever a demolition or construction activity takes place, its debris can be directed to such places in order of priority. However, such activity should be

planned and implemented strictly under supervision and approval of the concerned authority.

#### **4.8 INSTITUTIONAL AND REGULATORY ASPECTS**

There should be a proper institutional mechanism to take care of the collection, transportation, intermediate storage (if necessary), utilisation and disposal of the construction and demolition waste. In a number of municipalities, the Sanitary Department or the Health Department is responsible for the municipal garbage whereas the Engineering or the Planning Department is responsible for construction and demolition waste. Under such circumstances, it is extremely important that either the Solid Waste Management Department is made responsible for collection of construction and demolition waste or these departments work in close co-ordination.

It is essential that proper accountability is fixed and official information is readily available regarding day to day situation.

Private enterprise can be gainfully employed for the collection and transportation of the waste. Strict control of the concerned civic authorities is essential. If the municipality has suitable vehicles and containers, these can be leased to the private enterprises. There must be proper contract agreement protecting the genuine interests of the private enterprise and the civic authorities.

Thus the following four options are possible :

1. The total activity may be contracted out.
2. Only vehicles may be leased out by the civic body to the private contractor for transport of debris with his own labour, i.e., labour contract.
3. The vehicles may be hired by the local body from private sources for transport of debris with municipal labour.
4. The total activity may be carried out by the Department, i.e., the municipality.

The civic authority should consider the following points and after deliberations get them approved by the competent authority, except the those which already exist in their municipal act.

- The civic authority should notify that no person should dispose of construction/demolition waste on the streets/pavements/storm drainage/open land belonging to the municipality or the government. In

case such waste is dumped on a private land, the owner of such land would be accountable for the act and would be held responsible for any degradation of the surrounding environment or causing of any pollution.

- Such waste should be stored within the premises till they are removed from the site to a place notified/permitted by the local body.
- The primary responsibility for removal of such waste would be that of the generator of such waste. The civic authority would charge suitably (at least full cost recovery) if they provide containers on hire and provide service for removal of the waste. In such case the local body would become the owner of the waste and would have the right to sale or auction the same.
- The generator of waste should inform the concerned civic authority in writing in advance before undertaking such activity and also deposit such fees as necessary according to the notifications of the municipality by way of container rent, stacking (on a public road/place) or hauling charges. There should be provision of suitable penalty clause by way of moderate to heavy fines etc. (depending on the severity of the offence) for violation of these rules and also for littering of construction debris.
- In case of new construction, the advance is to be deposited with the application for sanction of the building plan. The charges would be notified by the civic authority and would be refundable after due deductions in case of compliance of the stipulated laws. In case of any default, the whole amount would be confiscated.
- These rules/notifications would also be valid for Government, Semi-Government and Public Sector Departments.