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Management of Construction & Demolition Waste In Pune City

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Abstract: ***The construction boom in Pune is leading to generation of enormous of Construction & Demolition (CDW) waste and this trend is likely to further increase in recent decades. Pune is fast paced city and is known as IT and automobile hub of county with rapid growing population. A city with dynamic construction and real estate industry reinforced by some public infrastructure project of transportation and utilities. Rapid development has led to increase in construction activities in the city leading to increases in quantities of construction and demolition waste generated in the city. In this paper, content analysis approach was adopted to analyse the information collected from previous literature, government reports and information retrieved from relevant Construction & Demolition (CDW) waste management rules. This paper focuses on quantity & source of Construction & Demolition CDW waste; also reflects current scenario of disposal and its effects. It is anticipated that the collection plan could help in management of construction & demolition waste and in reduction of illegal dumping.***

Index: ***Construction and demolition (CDW) Waste, Quantity & Source, illegal dumping, waste collection plan.***

I. INTODUCTION

Contractors in India bring out construction projects in different basis they are viz. labor contract or turnkey basis. The labor contract is used to build small houses and are bring out by contractors and therefore, it is very vital to control the amount of waste generated during the whole process of construction phase. The waste generation is about 7%. The large projects are bring out on the basis of turnkey or they may execute these large projects through their own team of stakeholders and there is waste generation of about 3%. It is estimated that the total construction waste generated from industries in India is about twelve to fifteen metric ton every year.

Therefore, the management of construction and demolition waste is attracting the people. The construction and demolition waste is an inert material contain different materials like concrete, bricks, tiles, etc. The waste also has some dangerous substances for environment and public health like phosphorus.

This is what the reason behind attracting people for managing this huge amount of CDW and finding new ways to dispose it off. This CDW is inert in nature which contains different materials like concrete, bricks etc. These CDW also contains different toxic substances which are hazardous in nature like Phosphorus.

When this CDW is added with some other wastes:

1. It makes the other wastes heavy as this is heavy in nature.
2. It also deteriorates the quality of other wastes and further treatments become difficult
3. These materials may choke the drains by going down into the drains

II. RESEARCH OBJECTIVE

- To investigate the quantity & sources of CDW waste in Pune Municipal Area.
- To determine the current scenario of CDW waste disposal and its effects.
- To suggest the CDW waste collection plan for reduction in illegal dumping.
- To increase the use of CDW waste in recycled products.

III. METHODOLOGY

IV. EXPERMENTAL WORK

Collection of CDW Waste:

The construction and demolition waste was collected from different sites. The waste included concrete blocks, aggregate, masonry blocks, tiles chips, etc. The all material was broke to desired size and shape and sieved through different size.

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Fig No.1 the Construction & Demolition waste collected from sites

Fig. No. 2. Construction & Demolition waste after sieve

	Pass through 20mm and retained on 10 mm
	Pass through 10mm and retained on 4.75mm
	Pass through 4.75 mm

Cube Casting

The cubes were made up of M10 grade. The mix design proportion was 1:3:6.

Cube Details:

Total no of cubes: 6

Size of each cube: 15cm* 15cm *15cm

Volume of each cube: 3375 cm3 = 0.003375 m3

Concrete Mix Design Proportion

The w/c ratio= 0.5

Use of Recycled Concrete Aggregate:

i. Coarse Aggregates:

The 100 % aggregate is replaced by Recycled Concrete Aggregate. Out of it 60% RCA is sieved through 20mm and retained on 10 mm & 0ther 40 % RCA is sieved through 10mm and retained on 4.75 mm.

ii. Fine Aggregates:

20% of sand is replaced by RCA passing through 4.75 mm sieve. Other 80 % is natural sand.

Fig No. 3 Cube Casting

Test on Cubes:

After curing for 3 and 28 days

Weight of 3 Cubes: 23.84 kg

Density of cube: 23.84/0.003375*3 = 2354.56 kg/ m3

Usually the concrete density varies from 2200 to 2400 kg/m3

Fig No. 4. Weight of Cubes

Fig No. 5. Universal Testing Machine

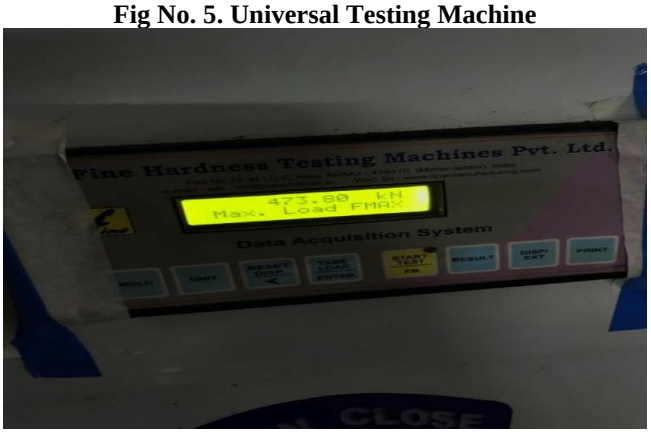

Fig. No. 6 Paver Block Casting

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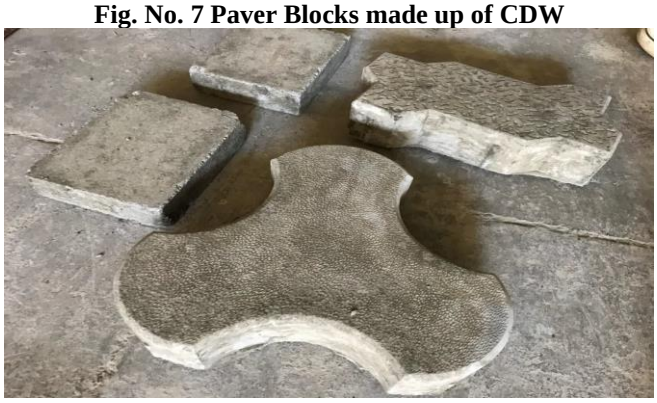
Fig. No. 7 Paver Blocks made up of CDW



V. PUNE CITY

Generation of Construction & Demolition waste in Pune city:

Pune city is producing 250-300 tonnes of construction and demolition waste per. But there are no any specific rules and place for disposal of such a huge amount of CDW. Therefore people are throwing it in solid waste or dumping on road or in river. This all things are creating problems to residents and its getting worse day by day.

Factors Affecting In Increase In Generation Of Construction & Demolition Waste In Pune:

a) Level of urbanization
b) Rate of growth of city
c) New development plans w.r.t. land use
d) Addition of 14 New town planning schemes
e) Transit Oriented Projects (Ex. Pune Metro)
f) Upcoming ring route projects
g) Increase in Floor Space Index (FSI)
h) Age of city
i) Population & its living standard
j) Pattern of construction in city

Current Scenario Of Construction & Demolition Waste Disposal In Pune City:

- Disposal in water resources:

Waste generator dumps the CDW in water resources near site. This clogged the water from flowing and results in increasing the water level in rainy season. It also pollutes the water resource and creates traffic problems in city in rainy season.

- Disposal on Road side:

When construction & demolition is dumped in roadside areas it blocks pathways and standing or waiting area of people. Usually these areas are in city so it affects the public health.

- Disposal on open land:

Contractors throw the waste on open land in city. This dumping increases with day by day and makes it barren after some years.

- Disposal in green areas:

Sometimes people drop this construction and demolition in green or vegetable area resulting in loss of productivity of land and reduction in green area of city.

Duties Of Waste Generator

- All waste generator are supposed to differntiate all construction and demolition waste at site only. The he has to send it to collection centre or call respective agency for collection.
- Generator should pack the material very consionly as per material properties. It should not liter on roa while transporting.
- FGenerator who are generating 300 tonne per project in a month has to present and clear waste collection plan before getting permission to start their project. They also has to pay some fees as per per tonne of CDW.

Methodology To Reduce CDW Waste In Pune City

i. Total generation of CDW waste is 250MT annually. To reduce the illegal dumping of this CDW waste stringent waste collection plan is prepared.
ii. The CDW waste generated is segregated in different types. The concrete is crushed into pieces more than 4.75 mm to 40mm and are sieved as per its size. This sieved material can be used as coarse aggregate. Similarly, the CDW waste crushed into less than 4.75mm can be used as fine aggregate.
iii. Making of small construction material like paver blocks, benches, compound walls, toilets using this CDW waste used material can be an another alternative for illegal dumping in city.
iv. Other demolished material like door, window frames, roofing can be reused to another habitations.
v. Recycled coarse aggregate can be replaced conventional coarse aggregate in construction. Recycled fine aggregate can replaced natural sand partially.

CDW Collection Plan

This plan is made for each and every generator who is interested in construction, demolition & repair work. The permission will be given for work only if he submit construction and demolition waste management plan and agrees to dump CDW wastes as per regulation

- Submit CDW wste Mng Plan
- Estimate quantity of waste to be generated and number of bins required
- Pay for the estimated quantity of waste generated at per the rate stated

- Collect card & login id in lieu of the payment
- Call the collection agency to provide Bins at site to request collection after a minimum quantity of 5 tons of waste is generated.
- When the bins are filled schedule a pick up with the Collection agency
- Swipe the card as per the number of bins to the collection agency
- Generator to enter the information of quantity of waste given into the online system
- Agency to empty the bins in its truck and transport it to processing plant
- Collection agency to update the information of quantity of waste collected into online system
- Transoprt the waste to processing plant site

VI. OBESRVATION

1. The stringent CDW waste collection plan can reduce illegal dumping in city. Pune city generates 250MT CDW waste annually. This will reduce water pollution, river clogging, traffic congestion, barrel land because of duping. Ultimately this can help to minimize environmental effects and contamination of soil.
2. The use of recycled coarse aggregate and fine aggregate will also reduce dependency on natural sand and aggregate. This will lower the need of digging mountains or other natural source so pollution occurring due to this will also lessen. Finally somehow will reduce global warming.
3. The reuse of material like doors, wooden frames for another habitant will minimize the burden on new material and will also be available at lower cost.

VII. CONCLUSION

The construction and demolition waste is becoming severe issue in Pune city. Pune city generates 250 MT annually. The contractors are disposing it on natural resources or on road as there are not any specific rules and regulations for its management. It is affecting environment and public health. A proper management of CDW can help to find the solution on this issue. Awareness about this is needed in society. The special action by respected corporation can help to reduce this problem. We can use 4R theory over here i.e. Reduce, Reuse, Recycle, Replace. CDW waste can be properly segregated as per their type of material can reduce the burden on nature. The material like doors, windows can be reused for another habituate. So this will help to lower demand of natural material or new products. The stringent CDW waste collection plan is made as per type of generator to reduce illegal dumping over natural resources. Paver blocks are made using recycled coarse and fine aggregates from CDW waste. This recycled aggregates is alternative to natural sand and aggregates. So it is replacing natural materials and reducing burden on nature. The CDW waste can be managed with proper plan and administration and also by reusing and recycling this materials.

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