The 15th Municipalika 2018
Exhibition and Conference

Importance of C&D Waste Recycling for Municipalities

Venue: Bombay Exhibition Centre, Mumbai.

by
Mr. Mohan Ramanathan, Managing Director
Advanced Construction Technologies Pvt Ltd.,
Chennai
PUBLIC OUTCRY TO MANAGE SOLID WASTE IN STREETS
GOVERNMENT INITIATIVES FOR SOLID WASTE COLLECTION
PUBLIC OUTCRY TO MANAGE SOLID WASTE IN STREETS
GOVERNMENT INITIATIVES FOR SOLID WASTE COLLECTION

Building Construction & Demolition Material Waste Recycling in India

Karnataka bid to promote clean city, penalise violators

Press Trust of India
Bangalore, July 27

The Karnataka Government appeared set for a crackdown on those who fail to segregate waste, and indulge in littering, spitting and other activities that tarnish the region's reputation. It is expected to table a Legislative Assembly amendment bill to the State's Solid Waste Management Act to make it more stringent and effective.

In a state where plastic use has become rampant, the move is expected to have a significant impact. The amended law, if passed, will make it mandatory for all residents to segregate waste into dry and wet categories. The first offender will be fined Rs 100, with Rs 500 for the second and Rs 1,000 for subsequent offences. The fine will be reduced to Rs 50 in case the waste is not collected by the local body.

Recycling in India

Building construction and demolition waste recycling has become a priority for urban planning in India. The government has taken initiatives to encourage recycling and reuse of waste materials. This includes setting up recycling facilities and providing incentives for the disposal of waste in designated areas.

The Karnataka Government has been proactive in addressing the issue of waste management. It has introduced measures to penalize violators, promote clean city, and encourage recycling. These initiatives are expected to have a positive impact on the environment and the community.

Penalty Amount
Was Hiked To
Rs 2,000 Recently
Christine Matthew Philip

The revised law aims to address the challenges faced by the local bodies in managing waste. With the new regulations, the government hopes to reduce the amount of waste sent to landfills and encourage the use of alternative disposal methods. The penalties for violating the law have been increased to ensure compliance.

Eating into Roads

The Karnataka Government has taken a step towards cleaning up the streets by implementing a new law that penalizes those who fail to segregate waste. The law also makes it mandatory for the local bodies to collect waste from streets at least twice a week.

Create a CLEAN city by handling waste responsibly

The Public Notice is hereby issued regarding the collection of Municipal Solid Waste within the BBMP area. BBMP has made necessary arrangements for collection and disposal of waste in a timely manner. Residents are requested to make use of these facilities and help the city to keep it clean.

GARBAGE SEGREGATION IS COMPLIANT

- Dry waste should be handed over daily to fixed waste collectors. (do not use plastic bags)
- Dry waste should be handed over weekly to fixed waste collectors.
- Sanitary waste shall be handed over monthly to the nearest authorized dry waste collection centres.
- Kitchen waste shall be disposed of separately at the nearest bio-medical waste collection facilities.

Bruhat Bangalore Mahanagara Palike
Commissioner

ACT
Concise Solution Providers

MUNICIPALIKAt
SMART & SUSTAINABLE CITIES
Segregate your garbage, win gold

Chennai: You now have a chance to strike gold with your garbage. In a desperate attempt to promote source segregation, the city corporation will hold a lucky draw every month and offer 1.8g gold to one resident of a ward where garbage is segregated in homes.

The project, expected to be approved at Friday’s council meeting, will be piloted scheme for three months. While one resident will get 1.8g gold, the next five people chosen in the draw will get watches. The project is expected to cost the corporation an estimated Rs 61 lakh.

The city generates nearly 3,000 tonnes of garbage, including 490 tonnes of plastic, every day. According to a June 2012 Central Pollution Control Board report, the city’s generation of plastic is more than Mumbai (424 tonnes) and second only to New Delhi (886 tonnes).

The corporation plans to collect at least 48 tonnes of plastic across the 300 wards. “Workers will visit each household on Wednesday and Saturdays and collect plastic waste. Each resident will be given a token,” a corporation official said. If any conservancy worker fails to collect plastic, then residents can also hand over the respective zonal offices and get tokens.

A committee will be formed to conduct lucky draws every month. “The winners will be selected among officials in the first week of the month and prizes distributed,” the official said.

Many residents are excited about the plan. “The idea sounds good. But there should be transparency in the lucky draw and in distribution of gifts,” said M Kamalam of Adyar. Her awareness should be created among the public before the project is launched.

So far, the corporation’s only effort in plastic waste disposal is laying plastic bituminous roads. It had initiated a drive against manufacture, sale and use of thin plastic by raiding shops and factories across the city selling more than 50 tonnes of thin plastic in 2012.

Environmentalists say source segregation should be compulsory in all residential complexes. The corporation should provide incentives for residents who segregate plastic at source. They should also involve rag pickers,” said an activist.

Garbage pile touches 4,900 tonnes/day

Sudden Spurt Makes Chennai Fourth Largest Waste Producer in Country

Chennai: The city’s garbage generation has increased by an astonishing 400% per day. Chennai now produces 4,000 tonnes of garbage daily, almost 4,000% more than five years ago.

The city has overhauled Kottapattu, notorious for its garbage, pushing the West Chennai capital to fifth place. Officials fear that Chennai may surpass Bangalore, the third largest producer of waste, in a couple of months. Bangalore produces 5,000 tonnes of garbage daily, only 50% more than Chennai.

Corporation officials said the city produces a minimum of 4,700 tonnes of garbage a day and attributes the rise to seasonal changes in waste output. “We are seeing an increase in the waste that the civic body’s lorry cart to the city’s dumping yards,” a corporation official said.

Among the largest producers of garbage in the city are Kottapattu, which is second to the city’s 50% increase in urban solid waste generation in 2012.

“As populations become wealthier, the consumption of plastics, paper, glass and cardboard increases, while the relative organic fraction decreases,” said a study. A second explanation is that there is a huge increase in plastic and paper waste in areas close to the city. The study rates Kottapattu higher than Mysore and Mangalore.

The corporation claims that the garbage is being moved from the streets. “This is why the numbers do not worry us,” officials said. “If garbage were to be moved from the streets, it would mean the city is clean.”
Challenges to Understand

- Awareness of C&D concept
- Education of all Stake Holders
- Enforcement of GOI Rules
- Technology Inputs
- Supporting Codes and Specifications
- Approvals & Certification
- Products research from C&D Waste
- Environmental Impact Study
Challenges to Understand

- Sustainable Business Model
- Government Incentives & Tax breaks
- Public demand and acceptance
- Swatch Bharath programs
- Model countries to emulate
- References available as guides
- By-products research
Key Activities
In C&D Waste Recycling Projects

- Selective Deconstruction
- On Site Segregation
- On site Downsizing
- Efficient Disposal
Approx. 530 Mn tonnes per annum of C&D Waste is generated in India

Opportunity to recycle inert waste for use in construction

Two plants have been successfully operating in India and IS standard has allowed use of C&DW material for construction

Composition of Waste

Current Waste Scenario: India

- Construction & Demolition, 55%
- Domestic Waste, 21%
- Others, 9%
- Chemicals, 8%
- Metallurgical, 4%
- Agriculture/Forestry, 2%
- Textile, 1%
Proportion of Various Categories of Material from C&D wastes (Chennai data)
General usage pattern of Construction & Demolition (C&D) Wastes (Chennai Data)
An Estimate of Indian CD Demolition Volume (2016) - Excluding Rock Demolition

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Description</th>
<th>Estimated Volume (Million Tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Metro City Demolition</td>
<td>15.0</td>
</tr>
<tr>
<td>2</td>
<td>Industrial Demolition</td>
<td>4.0</td>
</tr>
<tr>
<td>3</td>
<td>Urban Towns Demolition</td>
<td>3.0</td>
</tr>
<tr>
<td>4</td>
<td>Roads, Old Highways, Old Bridges</td>
<td>2.5</td>
</tr>
<tr>
<td>5</td>
<td>Repairs and Modifications</td>
<td>1.0</td>
</tr>
<tr>
<td>6</td>
<td>Construction Debris</td>
<td>2.0</td>
</tr>
<tr>
<td>7</td>
<td>Miscellaneous unaccounted debris</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>28.0</strong></td>
</tr>
</tbody>
</table>
### Building Construction & Demolition Material Waste Recycling in India

**Probable C&D Generation for Top 20 Indian cities. Estimated C&D waste in India=20 Million Tonnes (from Literature)**

<table>
<thead>
<tr>
<th>Sl.No</th>
<th>City</th>
<th>Population (Millions)</th>
<th>Probable C&amp;D Waste Generation (Million Tonnes) per Annum (Linked to population)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>New Delhi</td>
<td>23</td>
<td>3.5</td>
</tr>
<tr>
<td>2</td>
<td>Mumbai</td>
<td>21</td>
<td>3.2</td>
</tr>
<tr>
<td>3</td>
<td>Kolkata</td>
<td>15</td>
<td>2.3</td>
</tr>
<tr>
<td>4</td>
<td>Chennai</td>
<td>8</td>
<td>1.2</td>
</tr>
<tr>
<td>5</td>
<td>Bangalore</td>
<td>8</td>
<td>1.2</td>
</tr>
<tr>
<td>6</td>
<td>Hyderabad</td>
<td>8</td>
<td>1.2</td>
</tr>
<tr>
<td>7</td>
<td>Ahmedabad</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>Pune</td>
<td>4</td>
<td>0.6</td>
</tr>
<tr>
<td>9</td>
<td>Surat</td>
<td>4</td>
<td>0.6</td>
</tr>
<tr>
<td>10</td>
<td>Kanpur</td>
<td>4</td>
<td>0.6</td>
</tr>
<tr>
<td>11</td>
<td>Jaipur</td>
<td>4</td>
<td>0.6</td>
</tr>
<tr>
<td>12</td>
<td>Lucknow</td>
<td>3</td>
<td>0.5</td>
</tr>
<tr>
<td>13</td>
<td>Nagpur</td>
<td>3</td>
<td>0.5</td>
</tr>
<tr>
<td>14</td>
<td>Patna</td>
<td>2</td>
<td>0.3</td>
</tr>
<tr>
<td>15</td>
<td>Thane</td>
<td>2</td>
<td>0.3</td>
</tr>
<tr>
<td>16</td>
<td>Ludhiana</td>
<td>2</td>
<td>0.3</td>
</tr>
<tr>
<td>17</td>
<td>India</td>
<td>2</td>
<td>0.3</td>
</tr>
<tr>
<td>18</td>
<td>Agra</td>
<td>2</td>
<td>0.3</td>
</tr>
<tr>
<td>19</td>
<td>Pimple- Chinchwad</td>
<td>2</td>
<td>0.3</td>
</tr>
<tr>
<td>20</td>
<td>Bhopal</td>
<td>2</td>
<td>0.3</td>
</tr>
<tr>
<td></td>
<td><strong>TOTAL</strong></td>
<td><strong>125</strong></td>
<td><strong>19.1</strong></td>
</tr>
</tbody>
</table>
Building Construction & Demolition Material Waste Recycling in India

GoI of India Rules 2016
In India there is no such Code of Practice for Demolition. I am co-authoring the first ever “Deconstruction Manual” for GOI.
<table>
<thead>
<tr>
<th>Country/ Organisation</th>
<th>Recycled Aggregate (Type/Name/ Classification)</th>
<th>Aggregate Genre</th>
<th>Maximum RCA Substitution(a)</th>
<th>Maximum Recycled Aggregate Concrete 28 Day Cylinder Strength</th>
<th>Other Restrictions</th>
</tr>
</thead>
<tbody>
<tr>
<td>United Kingdom</td>
<td>RCA</td>
<td>RCA</td>
<td>NR</td>
<td>40 MPa</td>
<td>RCA and LCAGG. No chloride exposure. No freeze thaw</td>
</tr>
<tr>
<td></td>
<td>LCAGG</td>
<td>LCAGG</td>
<td>NR</td>
<td>NR</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RA</td>
<td>RA</td>
<td>20%</td>
<td>Designated concrete 20 to 40 MPa</td>
<td></td>
</tr>
<tr>
<td>Australia</td>
<td>Class 1A</td>
<td>RCA</td>
<td>30%</td>
<td>40 MPa</td>
<td>Only mild exposure.</td>
</tr>
<tr>
<td></td>
<td>Class 1B</td>
<td>RCA</td>
<td>100%</td>
<td>25 MPa</td>
<td></td>
</tr>
<tr>
<td>USA</td>
<td>LCA</td>
<td>LCAGG</td>
<td>100%(b)</td>
<td>20 MPa</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>25%</td>
<td>50 MPa</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>60%(c)</td>
<td>NS Concrete</td>
<td></td>
</tr>
<tr>
<td>RILEM</td>
<td>RCAC Type I</td>
<td>RA</td>
<td>100%</td>
<td>16 MPa</td>
<td>Masonry Aggregate. Exposure restrictions.</td>
</tr>
<tr>
<td></td>
<td>RCAC Type II</td>
<td>RCA</td>
<td>100%</td>
<td>50 MPa</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RCAC Type III</td>
<td>RCA</td>
<td>20%</td>
<td>NR</td>
<td></td>
</tr>
<tr>
<td>Korea</td>
<td></td>
<td>RCA</td>
<td>30%</td>
<td>27 MPa</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>30%(c)</td>
<td>21 MPa</td>
<td></td>
</tr>
<tr>
<td>Germany</td>
<td>Type 1</td>
<td>RCA</td>
<td>35%</td>
<td>25 MPa</td>
<td>In dry or low humidity environments.</td>
</tr>
<tr>
<td></td>
<td>Type 2</td>
<td>RCA</td>
<td>25%</td>
<td>30 MPa</td>
<td></td>
</tr>
<tr>
<td>Portugal</td>
<td>ARB1</td>
<td>RCA</td>
<td>25%</td>
<td>35 MPa</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARB2</td>
<td>RCA</td>
<td>20%</td>
<td>40 MPa</td>
<td></td>
</tr>
<tr>
<td>Hong Kong</td>
<td></td>
<td>RCA</td>
<td>20%</td>
<td>≤35 MPa</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>100%</td>
<td>20 MPa NS Concrete</td>
<td></td>
</tr>
</tbody>
</table>
## Manufactured Aggregate Permitted, (Table 1, IS: 383: 2016)

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Type of Aggregate</th>
<th>Maximum Utilisation, %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Plain Cement Concrete</td>
</tr>
<tr>
<td>1. Coarse Aggregate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Iron slag aggregate</td>
<td>50</td>
<td>25</td>
</tr>
<tr>
<td>b) Steel slag Aggregate</td>
<td>25</td>
<td>Nil</td>
</tr>
<tr>
<td>c) Recycled Concrete Aggregate (RCA)</td>
<td>25</td>
<td>20 (≤ M25 Grade)</td>
</tr>
<tr>
<td>d) Recycled Aggregate (RA)</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>2. Fine Aggregate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Iron Slag aggregate</td>
<td>50</td>
<td>25</td>
</tr>
<tr>
<td>b) Steel slag aggregate</td>
<td>25</td>
<td>Nil</td>
</tr>
<tr>
<td>c) Copper slag aggregate</td>
<td>40</td>
<td>35</td>
</tr>
<tr>
<td>d) RCA</td>
<td>25</td>
<td>20 (≤ M25 Grade)</td>
</tr>
<tr>
<td>e) Bottom ash</td>
<td>Nil</td>
<td>Nil</td>
</tr>
</tbody>
</table>
Building Construction & Demolition Material Waste Recycling in India

Demolition Processes
Building Construction & Demolition Material Waste Recycling in India

Waste Recycling Process
Building Construction & Demolition Material Waste Recycling in India

Few Applications for Recycled Aggregates

1. Concrete Road
2. Bituminous Road
3. Hydraulically Bound Road
4. Ground Improvements
5. Earthworks - Embankments
6. Earthwork - Cuttings
7. Shallow Foundations
8. Deep Foundations
9. Utilities
10. Utilities - Reinstatement in Roads
11. Concrete Sub-Structures
12. Concrete Structures
13. Buildings - Industrial
14. Buildings - Residential
New Demolition Rules to Assist Recycling (Proposed):

- Selective Demolition to be specified.
- On-site sorting to be specified.
- On-site crushing to be done for downsizing.
- Debris Management Plan to be insisted by all authorities.
- City / Municipality rules to be aligned for waste reduction and recycling.
- Central Recycling and Processing yard to be set up in every city over one Million population.
What is Selective Demolition?

“Selective Demolition” involves sequencing the demolition activities to allow the separation and sorting of materials. In general, domestic wastes such as furniture, household appliances, etc., metal components such as window frames, pipes, etc., timber components such as doors, wooden floors, etc., other wastes such as tiles, asphaltic materials, ceramic products should be removed one by one first.

The main demolition shall begin after all the above non-structural materials have been stripped and removed. As most old building blocks are built with brick walls on concrete frames, the percentage of brick is extremely high, ranging from 60% to 80%. To avoid mixing the non-recyclable bricks and tiles with the broken concrete, it is highly recommended to plan the demolition sequence such that brick walls are demolished first and stockpiled separately before the demolition of structural members.
What is On-site Sorting?

Without the implementation of selective demolition, all types of demolished materials will be mixed together. As a good practice, they should be sorted on-site and be separated into different groups including broken concrete, rock, bricks, rubbles, asphalt, soft inert material and non-inert waste. Sorted materials should be delivered to the recycling facilities as far as possible. In India, on site sorting is adopted by scrap merchants who sort, clean and even clean up resalable scrap. But C&D is left unsorted as they see no value and this ends up as land fill. However steel reinforcements are sorted and recycled.

What is On-site Crushing?

On-site sorting involves downsizing of large debris that has already been sorted. For this, small bucket crushers, crushing buckets and medium sized tracked crushers are available. The sorted down-sized C&D waste becomes a readily saleable material that can easily sold as sub-base or GSB for roads or sent to bigger recycling plants for further processing.
Building Construction & Demolition Material Waste Recycling in India

Examples of On-Site crushing using simple machines

Crushing of old Railway sleeper using Bucket Crusher
Building Construction & Demolition Material Waste Recycling in India

ASPHALT MILLED FOR RECYCLING
Building Construction & Demolition Material Waste Recycling in India

CHENNAI

SORTING OF REINFORCEMENT STEEL FOR RECYCLING
Strategy Suggested to Exercise Waste Management

- Mandating adoption of waste management plan at national level, such as in Germany, Denmark and Hong Kong.
- Propose Selective Demolition in tender stage itself
- Setting target on achievement on recycling by stages.
- Imposing tax on waste disposal.
- Tax exemption for usage of RCA to encourage use of recycled aggregates
- Increasing effort in education and information on waste reduction and recycling to identify and exploit the opportunities of recycling and overcome the barriers and obstacles due to conservatism.
Waste Management Plan

- Waste management plan should cover activities at conceptual and planning stages through design and construction stages, maintenance and reconstruction stages.
- Methodical planning and reviewing of Waste minimization, reuse, recycling and disposal.
- Planning to include life cycle cost on waste disposal.
Products from Recycling C&D waste

- Recycled Aggregates (RCA) can be used for Concrete, Roads as sub base, Ground Improvement, Ballast for Railway track
- RCA for Pavement Blocks, hollow blocks, tiles
- Smaller fines in manufacture of tiles, hollow and solid blocks
- Fine dust in ceramics.
- Washed clay fines and brick dust in brick making industry.
Recycled Aggregates (RCA)

- Extraction of aggregates and sand from crushed concrete
- Aggregates and sand are in fact natural
- Weak sand, aggregates and mortar transformed into more stable, smaller but stronger aggregate and sand under the crushing forces.
- No significant difference in physical properties.
- Surface texture of recycled aggregates may be more angular.
- Higher water absorption.
Using Recycled Aggregates in Concrete Production

- Control water content
- Presoak recycled aggregates
- Adjust mix proportion (recipe)
- Adjust admixture/additive.
- Set/Harden Faster
- Slightly increase in production cost.
Promotion of Wider Use of Recycled Aggregates

- Time and appropriate policy
- Education and communication to overcome conservatism, resistance and huddle in using recycled materials
- More research and development
- Set standard and specification for reference
- Quality assurance - testing and accreditation
- Transparency and exchange of information with academics
- Participation of stakeholders
- Pilot Projects
- Effective administrative measures, including charging of waste disposal, aggregate tax, waste management, etc., incentive to presort at sources, use recycled and recyclable material, leading to reduction in cost of recycling and hence slow up the rate of depletion of natural resources.
On-Site Recycling

- Consider at the planning stage with allocation of space for recycling.
- Design to use recycled aggregates based on its properties rather than replacement.
- Specify on-site recycling and use recycled products in contract document.
- E.G. Reconstruction of Superhighway (outer bound) in Germany.
- On site recycling.
- On site batching.
- Use recycled aggregates in pavement reconstruction.
- Minimal waste generation.
- Less traffic loading and less pollution.
- Reduced carbon footprint.
- Less cost.
Way Forward

- City Authorities like BMP, BMC, CMDA, DDA, NDA to specify new modern demolition methods and enlist professional agencies for demolition contracts.
- City authorities to allot free space to encourage debris recycling plants.
- Recycling concept to be integrated with construction and demolition.
- Entrepreneurs to be encouraged to start recycling plants in every major City.
- India to have professional body of demolition contractors and experts, to have a collective approach (similar USA, UK, Germany).
- Disaster Management: Dependency and involvement of specialized agencies in times of disaster like Earthquake, Flood, Building failures, Tsunami.
- Government to allow duty free imports of specialized demolition equipment to give encouragement to the Demolition Industry.
Structural Engineers and Planners of today must work out a demolition plan for every major structure that is designed and built today. Such plans must be stored in the archives of City Authorities, Municipalities and Libraries for use by posterity.

Most of the structures that are built today will soon outlive its utility and will come up for demolition in the next 40-50 years. We cannot afford to have structural graveyards in the modern world. There are huge old giant unserviceable buildings in the former Eastern Block in Europe and in former Soviet Union that are standing examples.
Way Forward

Hundreds of Thermal, Nuclear & Hydro Power Plants, Underground Metros, Airports, Large Malls, giant IT Parks, Factories, Roads, Bridges, Stadiums, Wind farms, commercial and residential buildings are being built all over India today. Not all of them will be considered as monuments for preservations. Very soon these structures will need to be demolished for one reason or the other. Our posterity will be faced with this Herculean task. We, as intelligent engineers, should shoulder the responsibility now and draw out detailed demolition plans and method statements for future use. City authorities may even insist on this at the time of approvals.
Buildign Construction & Demolition Material Waste Recycling in India

Way Forward

City authorities to allot free space to encourage debris recycling plants

- Recycling concept to be integrated with construction and demolition.
- Entrepreneurs to be encouraged to start recycling plants in every major City
- Mobile crushers are the answer for tackling our urban construction debris
Washing systems help remove fines and clean up the crushed aggregates.

- Combo Alpha
- Sirocco Air Classifiers
- Ore Max Dual Wash Plant
- Combo X70-Mobile Wash Plant
CONSTRUCTION WASTE RECYCLING: Plants in India

Ridhi Equipments has also recycled Slag—which is a stony waste matter separated from Metals during smelting or refining of ore. The recycled slag was converted into slag sand which is a good alternative to river sand. There has been a great shortage for river sand in the last few years.
CONSTRUCTION WASTE RECYCLING:
Photo’s of Various Crushers

Mobile Crusher
Portable Crusher
Bucket Crusher
Stationary Crusher
Building Construction & Demolition Material Waste Recycling in India

Typical aggregate washing plant

Typical mobile crushing unit

KEY EQUIPMENT FOR WASTE RECYCLING PLANT
Building Construction & Demolition Material Waste Recycling in India

WISH LIST FOR INDIAN DEMOLITION SITES

CRUSHING BUCKET

BUCKET CRUSHER

ON SITE CRUSHER
WISH LIST FOR INDIAN RECYCLING STATUS

TYPICAL C&D RECYCLING PLANT
Outline of C&D Waste Recycling Process

**INCOMING MATERIALS**

- LARGE GENERATORS
- COLLECTION POINTS
- MCD DUMP

**INSPECTION**

**SEGREGATION**

- REJECTS
- PASS

**BIG CONCRETE BLOCKS**

- Crushed to (200-400)mm

**MIXED C&D WASTE**

- Grizzly Set (Filters 200mm size)

**WHOLE BRICKS**

- Kept separately for internal use

**DRY PROCESS**

- 10-20mm
- 5-10mm
- 5-75um

**IMPACT CRUSHER**

- Size reduction to 60mm

**WET PROCESS**

- 60-20mm
- 20-10mm
- 10-5mm
- 5mm-75um

Rags, Plastics, Metal, FRP Sheets
SALIENT FEATURES OF BURARI C&D WASTE RECYCLING PLANT

- A unique large scale C&D recycling facility in the Country, compliant with Rules
- Engineered to process mixed Indian C&D waste
- Reduces usage of natural resources and enhances conservation
- Reduces sand mining from river banks
- Washing water recycled, only 10-15% makeup water
- Reduces burden on the landfill sites, saving precious urban land
- Reduces air pollution
- Able to recycle/recover about 95% of incoming waste
Mixed concrete and brick base is converted into Recycled aggregates which is used for making mortar sand, Concrete Blocks and Granular Sub-base.

By use of egg laying machine, concrete blocks of following sizes are made.  
Brick 1: 400mm X 200mm X 200mm  
Brick 2: 400mm X 150mm X 200mm  
Brick 3: 400mm X 100mm X 200mm  
Brick 4: 400mm X 150mm X 185mm

Concrete Blocks produced meets the strength and dimensional specifications prescribed in IS 2185 (non load bearing concrete Blocks)
Material Recovered From C&D Waste

Mixed Waste

Concrete Waste

Recycled Aggregate (RA)

Recycled Concrete Aggregate (RCA)

Sand Substitute Aggregate
- 3 mm

Aggregate 10-20 mm
Aggregate 3-10 mm
Aggregate 3-10 mm
Aggregate 10-20 mm
Recycled Green Products
Building Construction & Demolition Material Waste Recycling in India

Glass Bottle Recycling in Hong Kong

End Product: Paver Blocks for Hong Kong Streets
FUTURISTIC INVENTION FOR CONCRETE RECYCLING:
ROBOT FOR EATING CONCRETE
This Resort in Belgaum is built completely out of Salvaged Building waste and debris and even located in an abandoned stone quarry. A classical example of C&D recycling and reuse.
SUGGESTED STRATEGIES TO EXERCISE WASTE MANAGEMENT

- Mandating adoption of waste management plan at national level, similar to Germany, Denmark and Hong Kong.
- Impose tax on indiscriminate waste disposal.
- Tax exemption for usage of RCA to encourage use of recycled aggregates in new construction.
- Increasing effort in education and information on waste reduction and recycling to identify and exploit the opportunities of recycling and overcome the barriers and obstacles due to conservatism.
- BIS Code to permit the use of Recycling Aggregates in Construction of Roads, Buildings etc.
SUGGESTED STRATEGIES TO EXERCISE WASTE MANAGEMENT

- Waste management plan should cover activities at conceptual and planning stages, design and construction stages & maintenance and reconstruction stages.

- Methodical planning and reviewing of Waste minimization, reuse, recycling and disposal

- Planning to include life cycle cost on waste disposal.
Building Construction & Demolition Material Waste Recycling in India

By Products from Glass Waste.
Innovative Use Of Concrete, Chennai
Building Construction & Demolition Material Waste Recycling in India

REDUCE...

RECYCLE...

REUSE...

THIS IS JUST THE BEGINNING....
NOT THE END...THANK YOU
Thank You for your presence by M.R.