



**Department of Civil Engineering
Indian Institute of Technology Kanpur**

C&D Waste Handling Business Opportunities & Technical Challenges

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Key Points

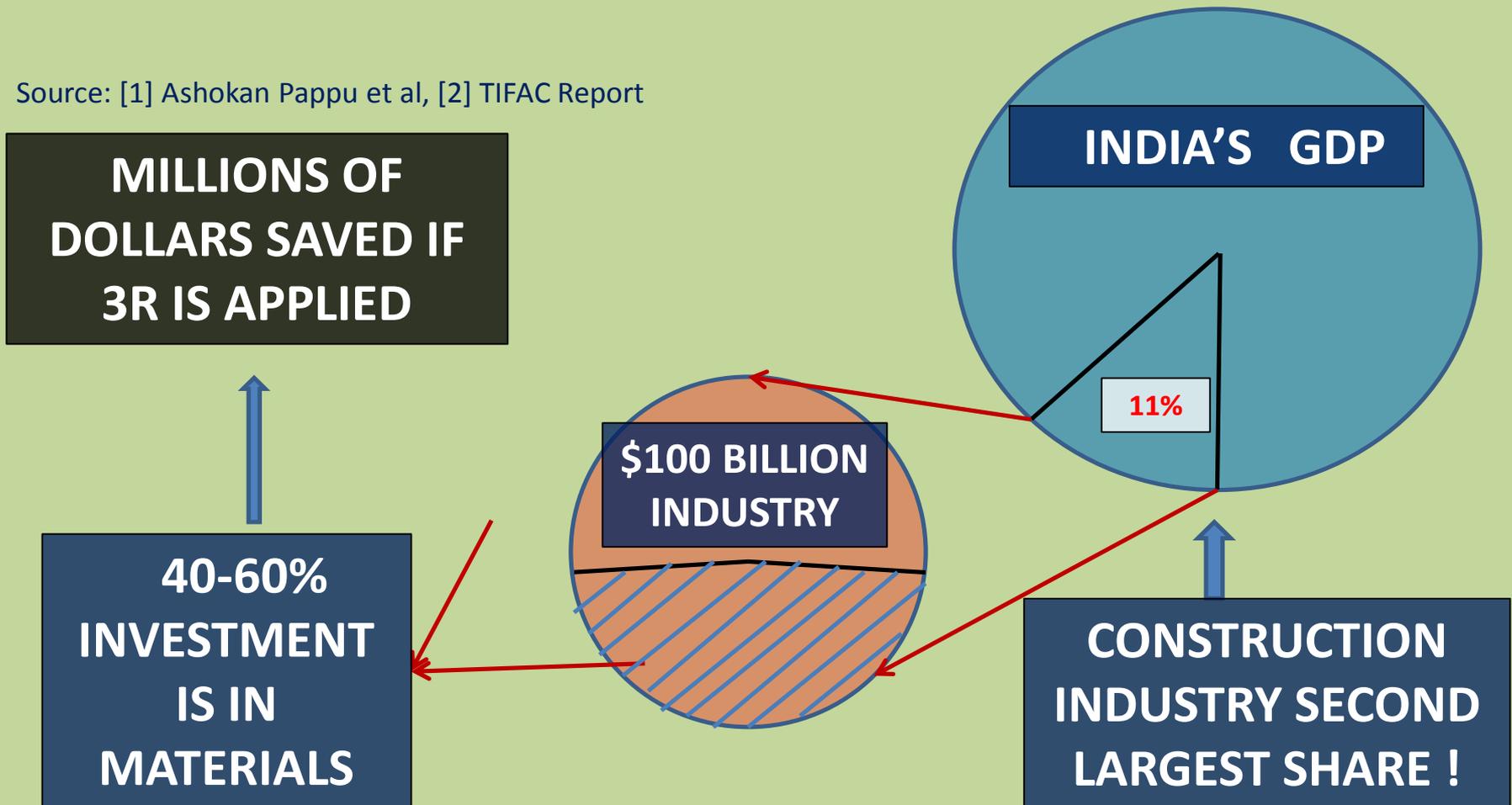
1. Introduction to Construction and Demolition Waste in India
2. Bottlenecks in Construction and Demolition Waste Handling
3. Business Opportunities in bottlenecks
 - Onsite Waste Handling
 - Recycling Facility
 - Recycled Material Utilization
4. Future course of Action (to be finalized towards to end!!)



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Size of Construction Industry

Source: [1] Ashokan Pappu et al, [2] TIFAC Report





Conflicting Numbers for C&D Waste

- Data in India is scarce and often it is more 'estimates'
- An estimate based on the waste produced per unit built-up area has been done by the Centre for Science and Environment, which puts the C&D Waste generated figures to **626MT in 2013 alone!!**



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Where does the C&D Waste Go ?

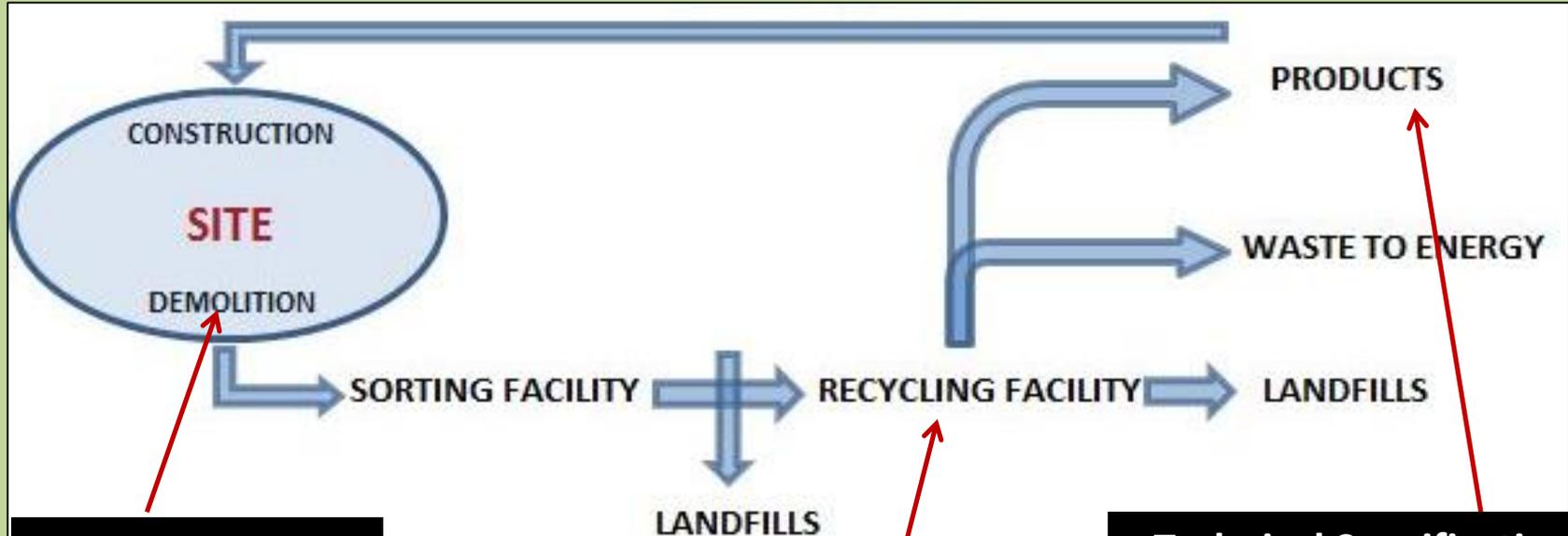




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Bottlenecks in opportunities and challenges

C&D Waste cycle



Reduction and Management of Waste on Site

Technology, Policy Framework, Government Subsidy and Operational Efficiency

Technical Specifications, (RMC, Aggregates and Finished Products)



Case Study: Building Demolition

- Planning the demolition
- Contractual provisions
- Waste produced, recycled and re-used



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Demolition Process and Planning

- Demolition was part of the re-construction contract and the contractor had bid for the 'demolished building'
- Top to down approach was planned
- Non-Load bearing parts were broken first by hammering and then the beams and columns.
- All demolition was done manually – tradeoff between Cost and Time !!
- Some recovered material was sold and remaining reused as filler/base



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Demolition carried taking care to remove the individual bricks as whole

Image: Girls Hostel, Credits : Chetan Chauhan, IIT Kanpur



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RC bought down to facilitate removal of steel that was are later sold as scrap

Image: Girls Hostel, Credits : Chetan Chauhan ,IIT Kanpur

3R Conference, Male, Maldives



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Onsite: Recycled/Recovered/Re-Used Products

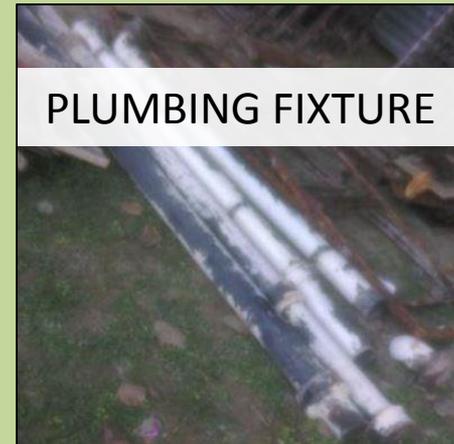


Image: Girls Hostel, Credits :Chetan Chauhan, IIT Kanpur



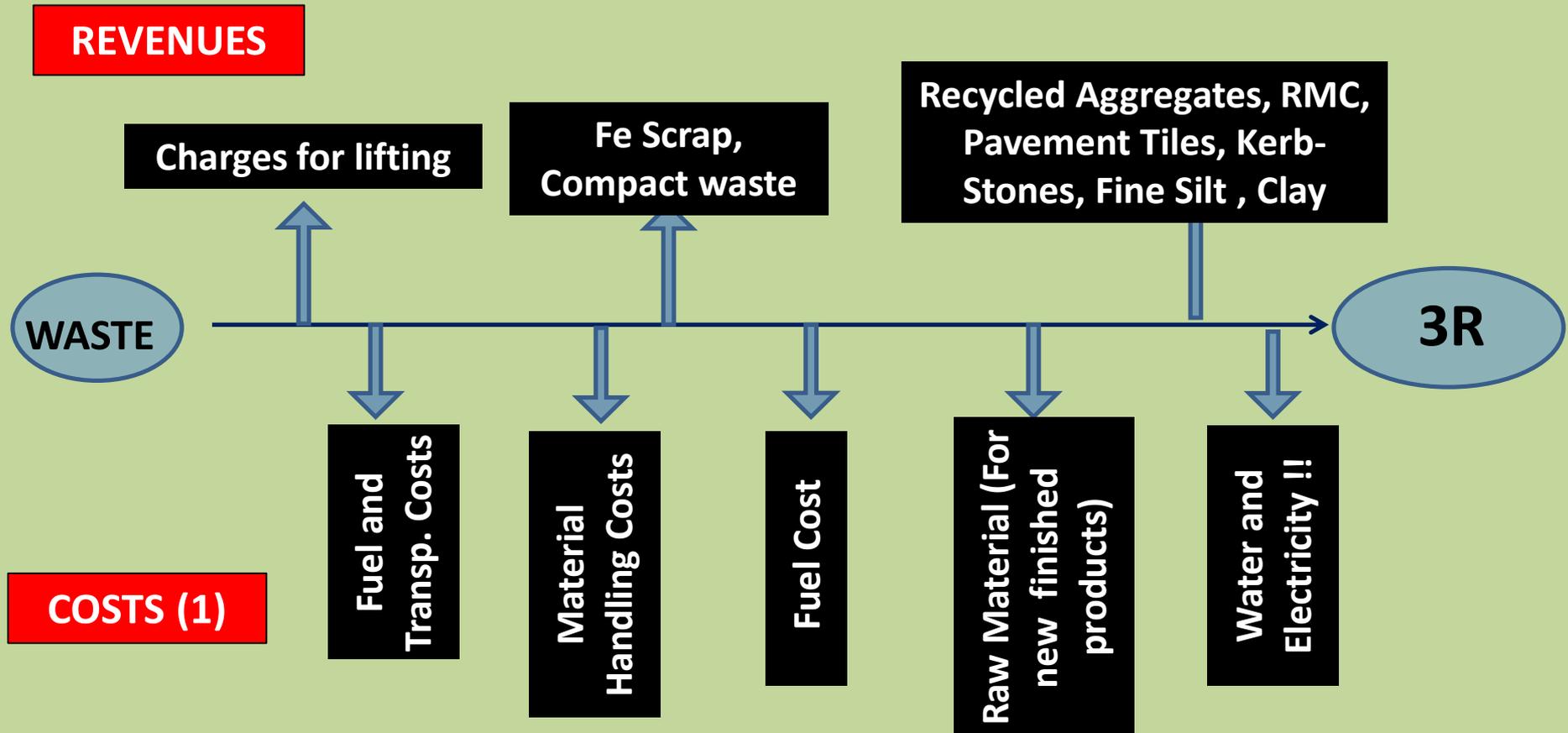
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C & D Waste handling facility



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Cost Analysis in Processing C&D Waste



COSTS (2) : LAND, MACHINES, OPERATION, PERMITS, ESTABLISHMENT



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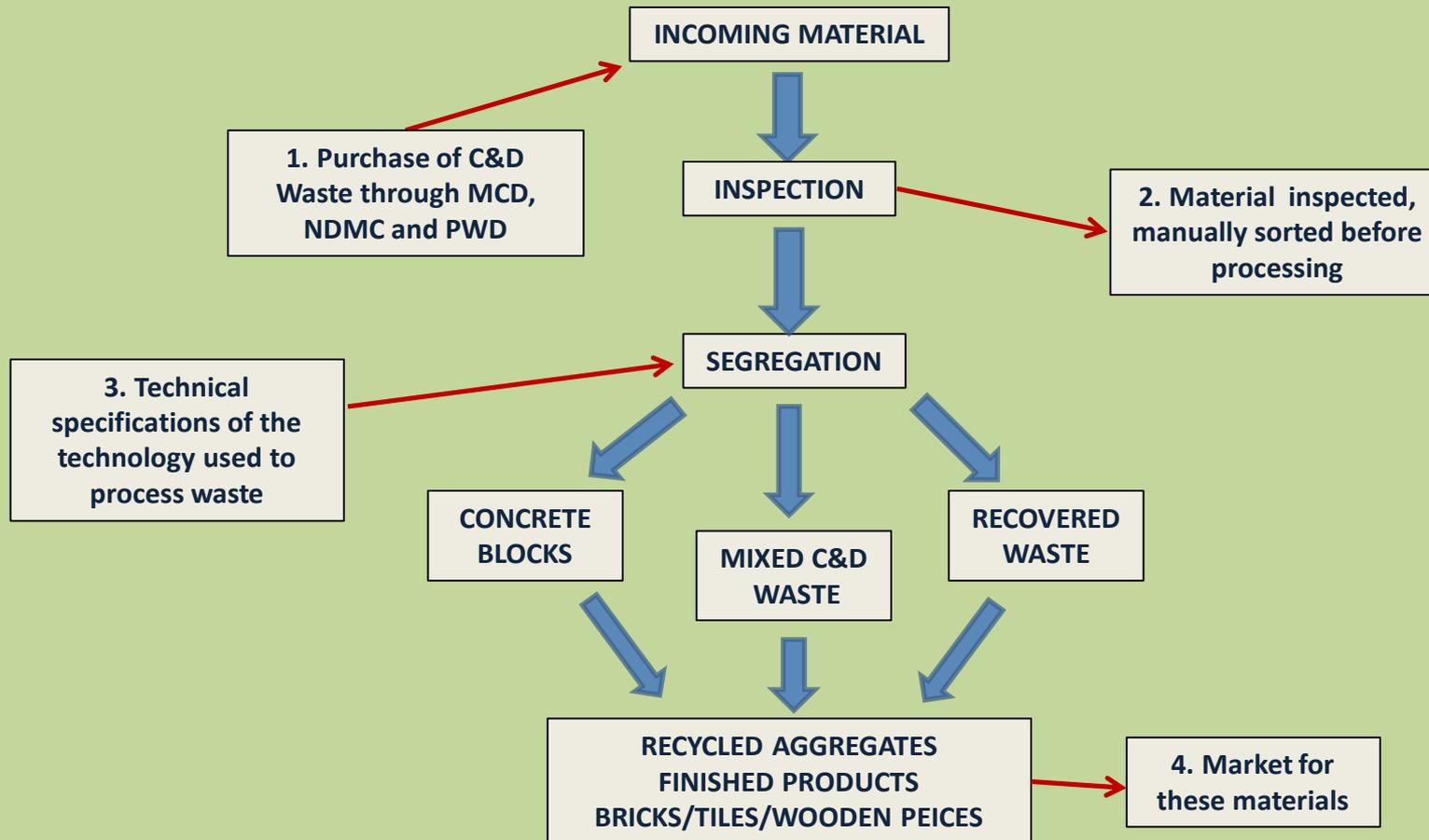
C&D Recycling Plant, Bhurari, Delhi





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Process Line Flow





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Some Details

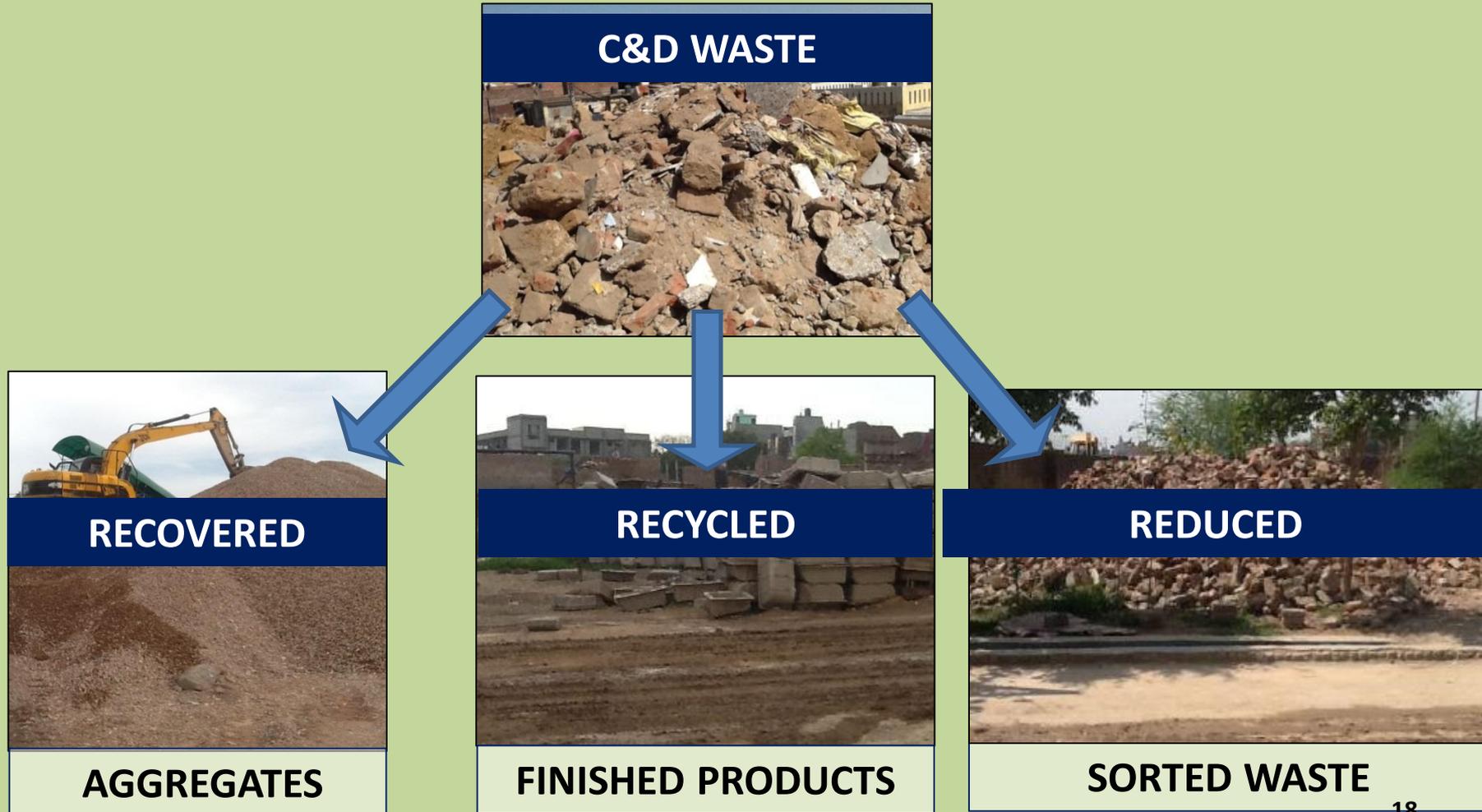
- Established with initial capacity of 500TPD, but now processes close to 2000TPD
- Waste is collected from designated sites in the city
- Alternate Waste Stream comes from government bodies like MCD, PWD, DMRC
- Incoming material is weighed and kept for sorting

Special Notes

- Incoming mixed C&D Waste consists of clean concrete pieces, bricks, tiles, wood, plastic and rubble
- Waste is generally free from Paints, Varnishes, Chemicals, Asbestos and Asphalt

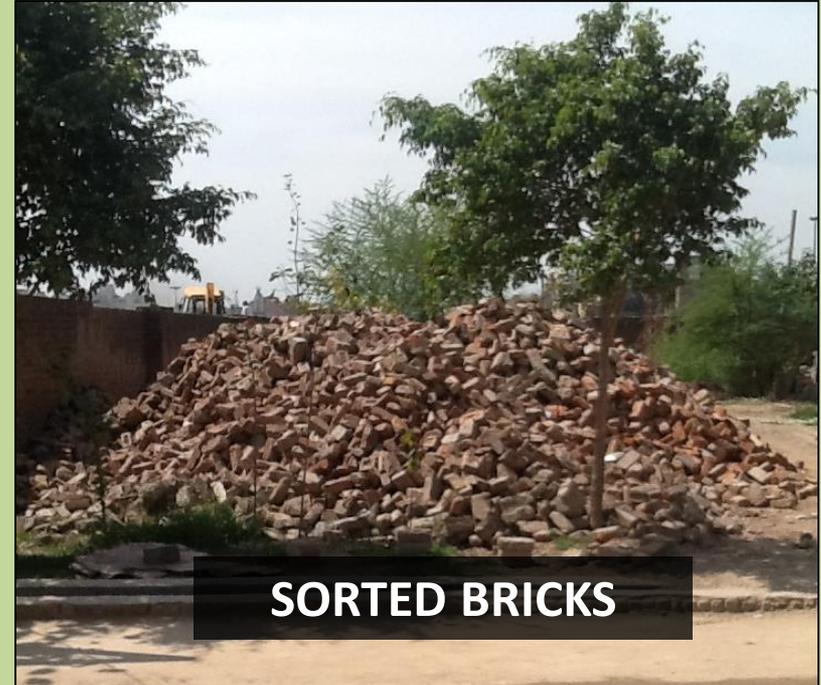


What is a C&D Recycling Plant ?





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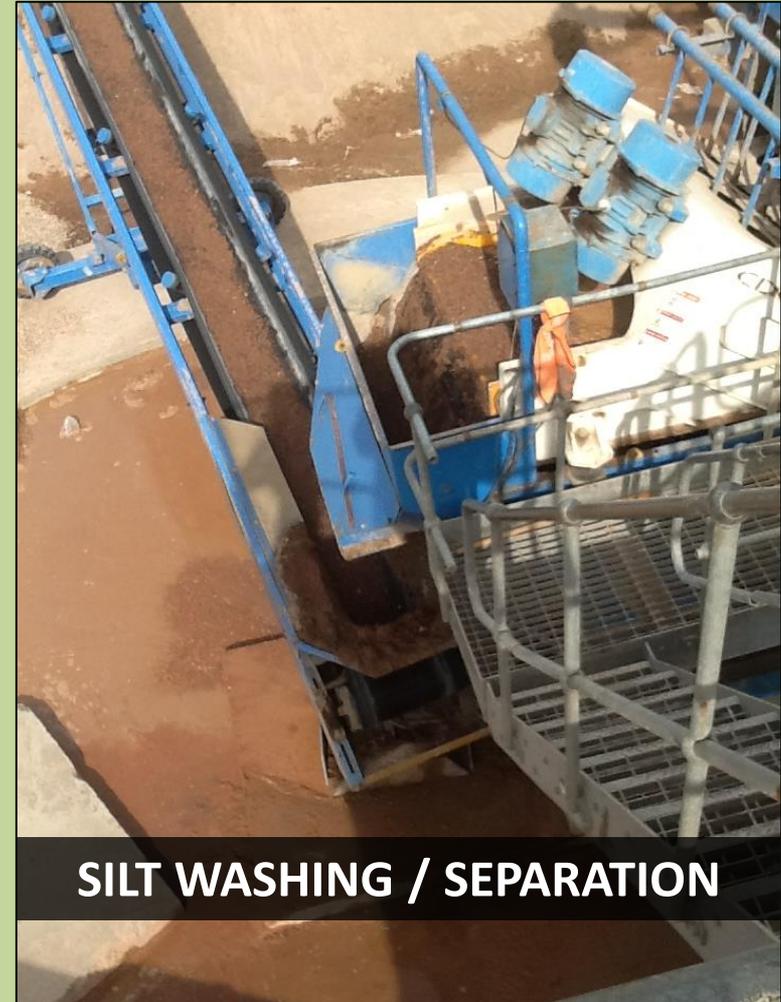
DRY PROCESSING



WET PROCESSING



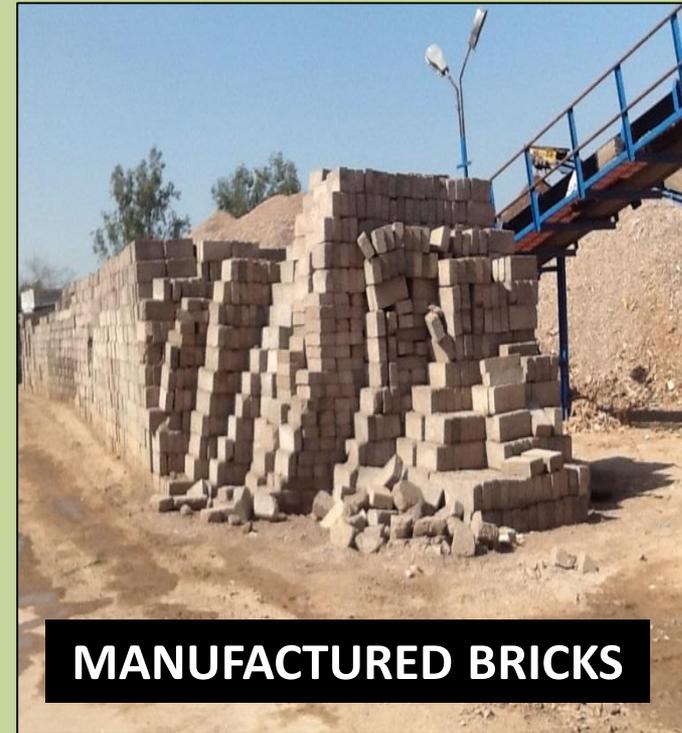
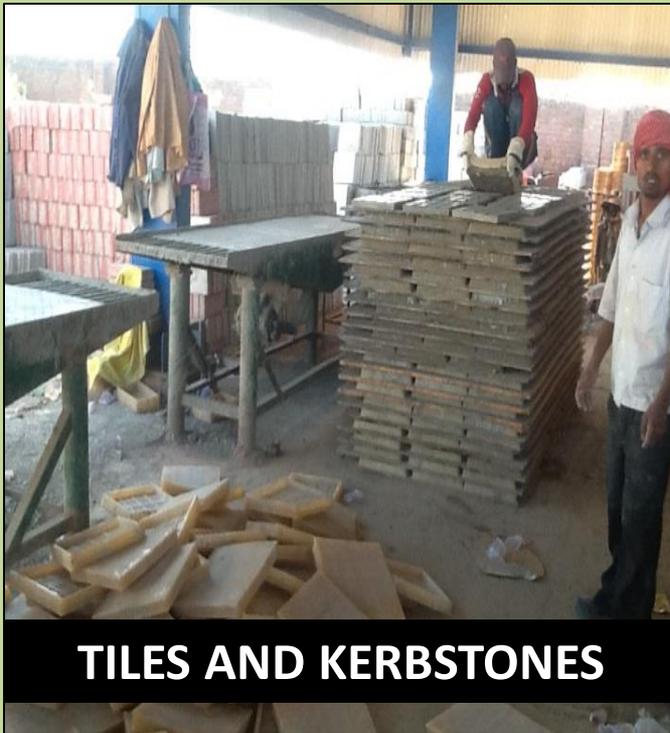
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Case Study: Finished Products





Business Opportunities to talk about

1. Model for setting up and running the plant
2. Costs, processing and possible subsidies
3. Manual Inspection of Materials (Livelihood and Sustainability propagated through this medium)
4. Appropriate technology – crushing, washing, separation



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Lessons for future plants

1. Large stream of incoming waste but stockpiles of processed material, which is not 'acceptable', even for non-structural purposes
2. Location and size of plants needs to be carefully decided
3. Impacts on Environment
 - A. Residential Area Proximity is an important criteria
 - B. Sound and Dust Pollution related considerations
 - C. Vibrations need to be controlled while the plant operates
 - D. Designated site to store the processed and unprocessed waste



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Using RCA (vs. Natural Aggregates) in concrete

Characterization of recycled material (aggregate)

- High Water Absorption
- Low ultimate Strength
- Low impact Strength/ Hardness of Aggregate



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An examination of the recycled material using tests for 'new' material, will only establish it to be a 'lower level material'. In order to use it (permit it to be used), we need provisions relating to the following

- **Structural vs. Non-Structural uses**
- **Level of Replacement**
- **Grade of the concrete**



Selling the products made from recycled material

- Quality of material
- User
- Price

Need appropriate technical and commercial guidelines



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Going forward

- **Compile a document that comprehensively addresses the diverse aspects of the problem – though the issues could be country specific, a basic template for compilation of information and data is urgently needed.**
- **The document should facilitate monitoring over a period of time, and set well defined targets and plans of action**



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:: Where there is a will, there is a way ::



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:: Thank you for your kind attention ::