CONSTRUCTION & DEMOLITION WASTE MANAGEMENT

KUSHAAGRA® Innovations Foundation

Managing Construction & Demolition Waste

Content

Definition of C&D Waste

"**Construction and Demolition Waste**" means waste comprising of building materials, debris, and rubble resulting from
Construction,
Remodeling,
Repair, and
Remolition of any civil structure.
The rules apply to every **individual, organization, or authority** who generates construction and demolition waste.

*As per Rule 3 ©,

C&D Waste Generation

New Construction – increasing urbanization and demand for housing and commercial space.
Demolition – Redevelopment of older structures in city centers, increasing property rates due to increasing population densities.
Infrastructure development – increasing public works such as Metro constructions, road widening, underground sewerage networks, electrical cabling, etc.
Interiors and renovations – Trends for fancy interiors and need to renovate.
Desilting activities – Cleaning of nallahs, check dams, waterbodies.

Quantity of C & D Waste generated

Uncertainty in Quantum of Generation

There is an uncertainty in the quantum of generation of C&D wastes in India either per month or annually.

Factors contributing to this uncertainty include the level of urbanization, rate of growth of cities, and development plans with respect to land use.

On average, C&D waste accounts for about **15%** of all solid waste produced in a city.

Thumb Rules for Estimation of C&D Waste Generation

TIFAC's thumb rules for estimation of C&D waste recognizes that the generation is project-specific. TIFAC's C&D waste estimations are as follows:

1. Range **40-60 kg** per sq.m of new construction

2. Range **40-50 kg** per sq.m of building repair

3. Range **300-500 kg** per sq.m for demolition of buildings

Impact of Improper C&D waste management

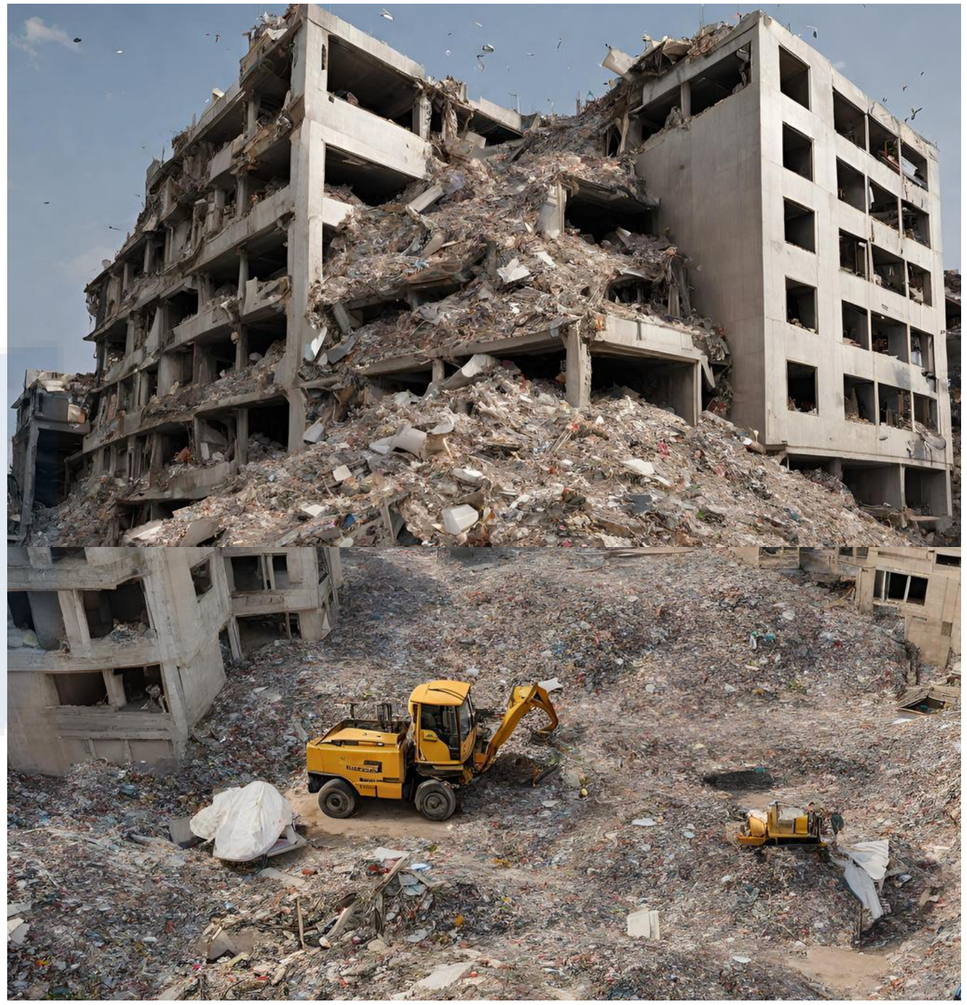
Air Pollution – Improper management at site and disposal leads to increase in air pollution.
Illegal Dumping - In low lying water bodies or areas or along road sides.
Impacts soil quality – Illegal dumping degrades the quality of soil for farming or plant growth.
Mixed with MSW – Increase weight of waste to be transported and degrades the quality of waste for processing.
GVP – Is a common factor leading to formation of GVPs.
Dumped in drains – this obstructs the flow of waste water leading to urban flooding.

Air pollution

Choking of drains

C&D Waste- current scenarios

50% of C&D waste in India is not recycled. The composition of C&D waste can vary depending on the age of the building being demolished/renovated or the type of buildings being constructed.
C&D waste generation figures for any region fluctuate as it depends largely on the type and nature of construction/demolition activities.



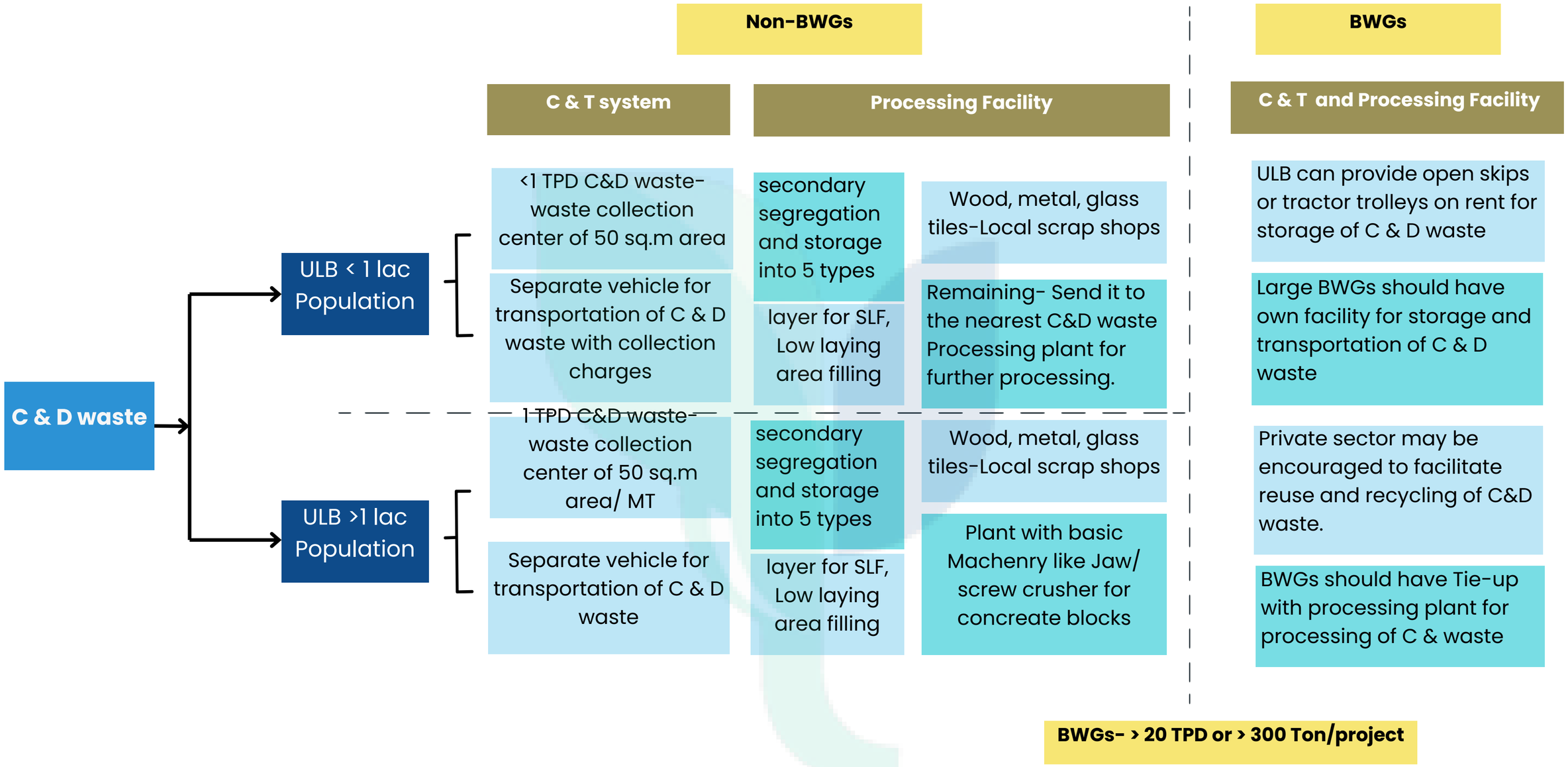
India's C&D waste generation in Estimates, ranging from 112 to 700 million tonnes/year As per the latest Records of 2020.

Typical Composition of Indian C&D Waste

- The major constituents of Indian C&D waste are concrete, soil, bricks, wood, asphalt, and metal.
- Brick & masonry, soil, sand & gravel account for **over 90%** of total waste.

Material	Composition
Soil, Sand & Gravel	36%
Brick & Masonary	31%
Concrete	23%
Metals	5%
Bitumen	2%
Wood	2%
Others	1%

C & D WASTE FLOW DIG



Steps to be taken by ULBs

Planning stage

- List of new construction/ demolution sites from Building Permission department
- Formal communication with contractor and Schedule for C & D waste generation and collection
- Verifying facilities and provisions made for C & D waste management
- Mapping requirements from ULB end for storage and further processing

Execution stage

Making arrangement for C & T and sorting & storage facility

Making arrangement for recycling of C & D waste

- Local scarp shops- Wood, metal, glass etc.
- Macheries required- movable jaw crusher on rent, JCB with breaker
- Cluster based approach for processing,

C&D Waste- Approaches for introducing Circularity

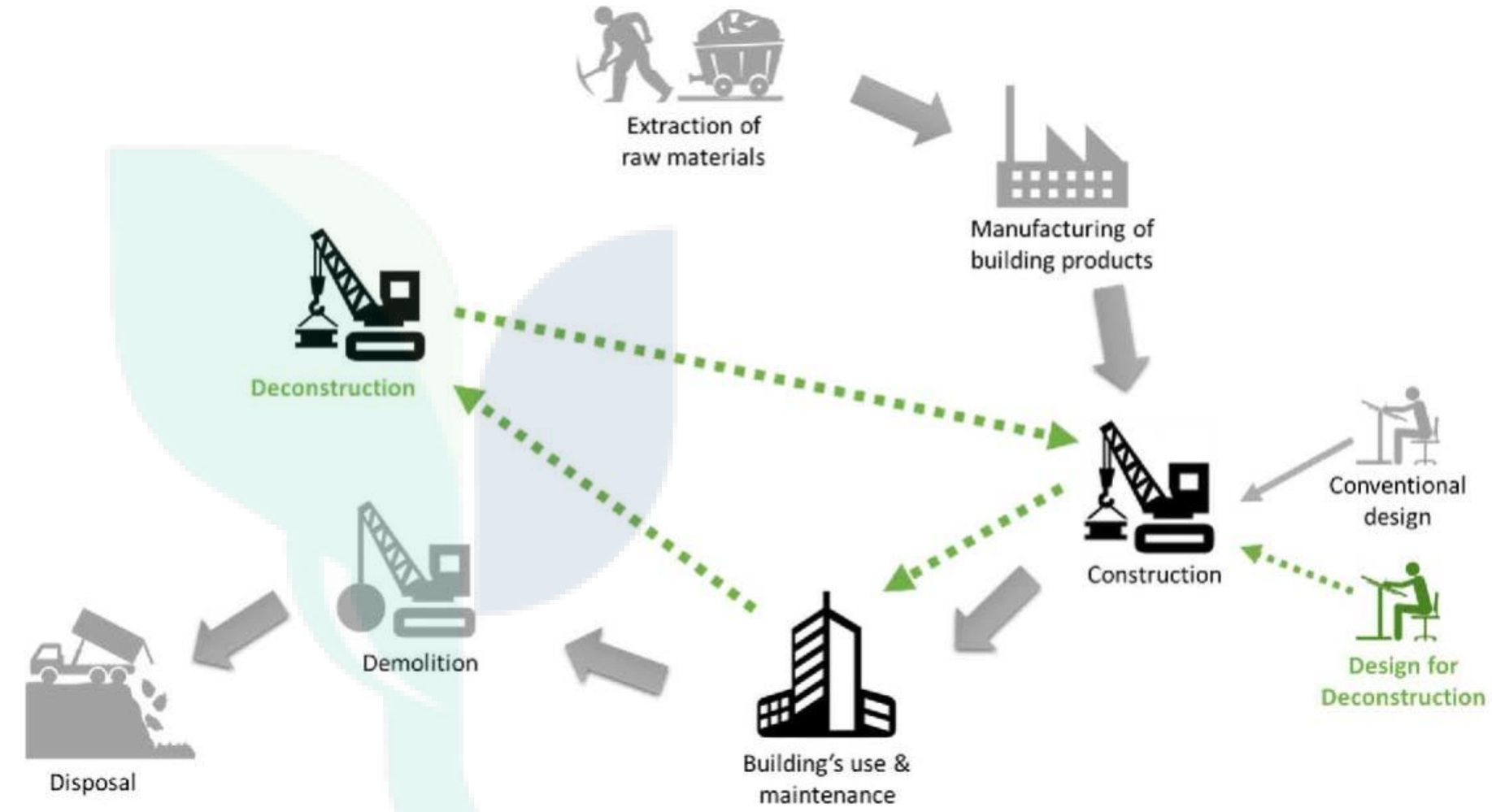
Design for Deconstruction (DfD)

It is a designing method that enables quality and quantity of materials that can be re-used at the end of a building's life

Design for reuse (Dfr)

It incorporates the use of reclaimed components in the design of new structures.

Design for longevity (Dfl)
It is a principle that current buildings in planning phase should be planned for long-term use. The construction material should be of top quality which could enhance the life of the building.



Circularity in C&DWM -Building life cycle with conventional method and design for deconstruction (DfD)

C&D Waste Processing & Its Recycled Products

C&D waste materials that are directly recycled/ sold generators for its value.

MATERIAL	PROCESS	END USE
Steel	Cleaned, Recycled	Reused steel components, New steel components, Aluminium recycling streams
Aluminium	Cleanly recycled	Aluminium recycling streams
Timber beams, doors etc.	Cleanly recycled	Reused as beams, doors etc. If free of hazardous preservatives
Timber boards	Cleanly recycled	Reused as shuttering, other products, Feedback engineered woods
Plastics	Recycled	Plastic recycling streams
Gypsum plasterboard	Cleanly recycled	Reuse as boards, Soil conditioner, New gypsum products
Glass	Crush, cleanly recycled	Glass recycling streams
Natural stone masonry	Cleaned	Reused for masonry

C&D Waste Processing & Its Recycled Products

C&D waste materials that are directly recycled/ sold generators for its value.

MATERIAL	PROCESS	END USE
Demolition waste	Crushed and sorted	Recycled aggregate
Construction waste	Washed to remove cement and recover aggregate	Recycled aggregate
Reinforced concrete	Crushed, sorted, and steel bars removed	Recycled concrete aggregate for recycling
Clay bricks, roof tiles	Cleaned	Reused for masonry
Calcium silicate bricks	Pulverised, Cleaned	Mixed with lime to produce mortar, Recycled into new calcium silicate bricks
Natural stone slabs	Crushed	Aggregate
Ceramic tiles	Crushed, Cleaned	Aggregate, Flooring, cladding
Asphalt paving	Crushed, Crushed cold mixed, Crush hot mixed	Road construction excluding wearing course

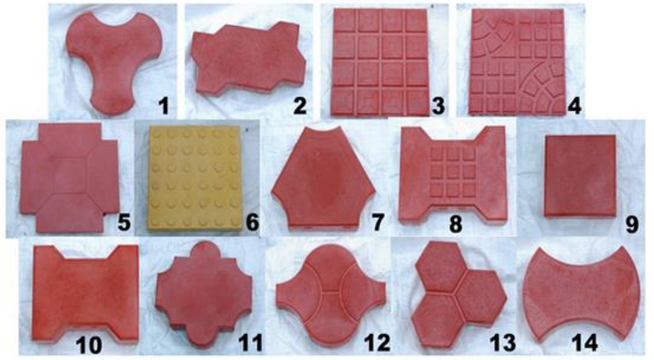
Applications of C&D Waste Recycled Material

Sr. No.	Description of Item	Specification Size	Application
1	Good Earth Produced in the process of filtration & pressing of slurry. Slurry is generated during the washing of C&D waste.	< 75 microns	Filling in low-lying areas
2	Screened Soil - Produced during the screening of C&D waste. It consists of Soil & Aggregate	< 26.5 mm	Back filling, Road construction & filling of ramp portion of the flyovers
3	Recycled Aggregate (RA)/ Brick Sub-Base (BSB) / Granular Sub-Base (GSB) Produced by Crushing & Washing of Brick Aggregate, Stone Aggregate, Tiles etc.	4.75 mm to 26.5/53mm & 11mm-53mm	Lean Concrete (M10, M7.5 grade) & PCC work. Recycled aggregate (RA) up to 100% for lean concrete has been permitted as per IS 383:2016
4	Manufactured Sand Produced by crushing & washing of C&D waste. It is a fine mixture of Stone & Brick Aggregates. All the properties are same as river sand except more water absorption capacity.	75 micron- 3mm	Brick work & PCC work
5	Recycled Concrete Aggregate (RCA)/ Stone Dust Produced by crushing concrete based C&D waste only.	RCA- 5mm to 20 mm Stone Dust- < 5 mm	Up to 25% in Plain Concrete up to 20% In RCC & 100% in Lean Concrete. (As per IS:383)
6	CC Blocks and Bricks Produced by mixing of recycled aggregate, sand with cement	400X200X100 mm	Used in non-load bearing areas like boundary/ partition walls

Final Products From C&D Waste

Kerb Stones

Pavement Blocks



Strength Specification specified in IS 15658 is being adhered.

Products from RCA

Concrete Blocks (GSB)