C&D WASTE RECYCLED BLOCK MASONRY

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C & D WASTE

• DEFINED AS ALL NON-HAZARDOUS SOLID WASTE RESULTING FROM CONSTRUCTION AND DEMOLITION ACTIVITIES.

• CONSTRUCTION AND DEMOLITION DEBRIS (C&D) MEANS THOSE MATERIALS RESULTING FROM THE ALTERATION, CONSTRUCTION, DESTRUCTION, REHABILITATION, OR REPAIR OF ANY MAN MADE PHYSICAL STRUCTURE INCLUDING HOUSES, BUILDINGS, INDUSTRIAL OR COMMERCIAL FACILITIES, AND ROADWAYS.
C & D WASTE SCENARIO OF INDIA

- Waste major contributor to pollution in capital
- New Delhi itself generates 6000 to 7000 tonnes per day (TPD) of C & D waste
- The waste generation for new construction activities and re-construction activities estimated as 35 and 350 kg/sqm & 2000 TPD C & D waste received at landfill sites in Delhi
- Similar situations in other metropolitan and large cities in India
• As per the report by the World Bank in 2012 cities produced 1.3 billion tonnes of solid waste per annum globally and predicted to rise to 2.2 billion tonnes by 2025

• According to study building materials alone constitute half of solid waste produced throughout the world
REQUIREMENTS OF USE OF C & D WASTE

• SAVING SCARCE NATURAL RESOURCES (STONE, RIVER SAND, SOIL ETC.)
• ENERGY CONSUMED IN MINING & EXTRACTION OF NATURAL RESOURCE
• ELIMINATING LONG DISTANCE DUMPING
• SPACE CONSTRAINT FOR LANDFILL
NEED OF THE HOUR

• 3-R: REDUCE, REUSE & RECYCLE MANTRA TO BE FULLY IMPLEMENTED

• INCASE OF C&D WASTE: RECYCLE TO BE IMPLEMENTED

• MAXIMUM UTILIZATION OF RECYCLED MATERIAL TO BE ENSURED IN NEW CONSTRUCTION ACTIVITIES TO SAVE NATURAL RESOURCES
RECYCLING of C & D WASTE

- CONCRETE AND OTHER RUBBLES (BROKEN BRICKS, TILES, STONES ETC) CAN BE RECYCLED INTO AGGREGATE
- ASPHALT CAN BE RECYCLED INTO NEW ASPHALT
- WOOD CAN BE RECYCLED INTO ENGINEERING WOOD
**RECYCLED AGGREGATES**

- RA IS MADE FROM C&D WASTE WHICH MAY COM普RISE CONCRETE, BRICKS, TILES, STONES ETC.

- RECYCLED AGGREGATES (RA) WILL TYPICALLY HAVE HIGHER ABSORPTION AND LOWER SPECIFIC GRAVITY THAN NATURAL AGGREGATES.
- Mixed concrete and brick base is converted into Recycled aggregates (RA)
- RA is used for making mortar sand, Concrete Blocks and granular subbase
- Using egg laying machine, concrete blocks of following sizes is made

Brick 1: 400 mm X 200 mm X 200 mm
Brick 2: 400 mm X 150 mm X 200 mm
Brick 3: 400 mm X 100 mm X 200 mm
Brick 4: 400 mm X 150 mm X 185 mm

Concrete Block Product and Dimensional Specifications Prescribed in IS 2185 (Non Load Bearing Concrete Block)
C & D WASTE RECYCLING PLANTS
IN NCT OF DELHI

- BURARI (2000 TPD)
- SHAstri PARK (500 TPD)
- MUNDKA (150 TPD)
Swachh Bharat: Delhi Setting an Example

Integrated Waste Processing: From Waste to Wealth

Waste a Major Contribution to Pollution in The Capital

- NDMC Rani Khera 1000 TPD
- DMRC Mundka 150 TPD
- PWD 500 TPD
- EDMC Shastri Park 500 TPD
- NDMC Burari 2000 TPD
- SDMC Bakkarwala 500 TPD

Existing C&D Plant

Proposed C&D Plant
C&D WASTE PRODUCTS

- CC BLOCKS FOR MASONRY
- PAVER BLOCKS
- KERB STONES
- DRAIN COVERS
- TILES
- FILLING MATERIAL
Recycled concrete aggregate (RCA) used for making value added products like Pavement block, kerb stone, drain covers, and other non load bearing pre cast products
PRODUCTION OF BLOCKS
ROLE OF CPWD

• CPWD CAN PLAY A KEY ROLE IN EFFICIENT USE AND MAXIMUM UTILIZATION OF C & D WASTE PRODUCTS IN CONSTRUCTION PROJECTS
GUIDELINES FOR USE OF C & D PRODUCTS

- AS PER THE DIRECTIVES ISSUED BY THE GOVERNMENT OF INDIA, CPWD HAS CIRCULATED GUIDELINES FOR IMPLEMENTING THE SAME
- REGULAR MONITORING BY THE DIRECTORATE FOR EFFECTIVE IMPLEMENTATION OF GUIDELINES
MANDATORY USE

• DIRECTIONS ISSUED BY THE MOHUA DATED: 22.05.2018 FOR USE OF RECYCLED MATERIAL AND PRODUCTS

• CPWD HAS ISSUED DIRECTIONS THAT SUITABLE CLAUSES AND ITEMS OF RECYCLED PRODUCTS SHALL BE INCORPORATED IN THE CONTRACT DOCUMENT BY NIT APPROVING AUTHORITY TO ENSURE 10-20% MANDATORY USE OF RECYCLED MATERIALS AND PRODUCTS FOR ALL CPWD NON SENSITIVE CONSTRUCTIONS IN NCT OF DELHI.
OFFICE MEMORANDUM

Construction & Demolition (C&D): Waste management processing facilities are available in the NCT of Delhi at Hurari, Shastri Park and Mundka with a combined capacity of more than 2500 MT/day for effective management of such waste.

IS:383-2016 has now permitted the use of recycled aggregates (RA) and recycled concrete aggregate (RCA) produced from other than the natural resources for using in plain and reinforced concrete. These changes have been incorporated in CPWD specifications vide OM no. DG/Specifications/C&D/08 dated 07/03/2016.

Ministry of Environment, Forest and Climate Change has notified C&D Waste Management Rules -2016 and circulated vide No. DG/CON/Misc/04 dated 23/01/2017 for necessary action by the field units.

With a view to ensure maximum utilization of C&D waste in the construction activities it is decided that suitable clauses and items of recycled products may be incorporated in the contract documents by the NIT approving authority.

Product manufactured from C&D recycled waste can be used in the works subject to quality control and meeting relevant standards and specifications. An indicative list of applications is as follows:

(i) Screened soil for filling applications in road work and under floors.
(ii) Recycled aggregates of size upto 150mm for sub-base applications in road work.
(iii) Manufactured sand in plaster.
(iv) Concrete blocks, kerb stones, paver blocks in open areas and footpath etc.

This issues with the approval of DG, CPWD

Superintending Engineer (IAS)
CSQ, CPWD, Nirman Bhawan
New Delhi

Copy to:- 1. All the S/DGs, ADGs, CE/CPMs, SES/PMs & EEs for necessary action (through CPWD website)

Superintending Engineer (IAS)
AS PER OM DT:03.05.2018

- SCREENED SOIL FOR FILLING APPLICATION IN ROAD WORK AND UNDER FLOORS
- RECYCLED AGGREGATES OF SIZE UP TO 150 MM FOR SUB-BASE APPLICATIONS IN ROAD WORK
- MANUFACTURED SAND IN PLASTER
- CONCRETE BLOCKS, KERB STONES, PAVER BLOCKS IN OPEN AREAS AND FOOTPATH ETC.
Corrigendum

In continuation of Office Memorandum No. 155/SE(TAS)/C & D waste/2018/256 dt. Dated 23/05/2018, Ministry of Housing & Urban Affairs (work division) vide OM No. 0-17024/86/2018-w-2 dt. 22/05/2018, it is decided that suitable clauses and items of recycled products shall be incorporated in the contract document by the NIT approving authority to ensure 10 to 20 % mandatory use of recycled material and products for all CPWD projects in NCT of Delhi.

This issues with the approval of DG, CPWD.

Superintending Engineer (TAS)
CSQ,CPWD, Nirman Bhawan, New Delhi.

Copy to:-
1. SDG (DR) for necessary action please.
2. &3 ADG(DR) & ADG (NDR) for necessary action please.
3. All the CE’s/ CPMS, SE’s/ PMs & EEs of Delhi region for necessary action (Through CPWD website).

Superintending Engineer (TAS)
AS PER CIRCULAR DT:13.06.2018

• SUITABLE CLAUSES AND ITEMS OF RECYCLED PRODUCTS SHALL BE INCORPORATED IN THE CONTRACT DOCUMENT BY THE NIT APPROVING AUTHORITY

• NIT APPROVING AUTHORITY SHALL ENSURE 10 TO 20% MANDATORY USE OF RECYCLED MATERIALS AND PRODUCTS FOR ALL CPWD PROJECTS IN NCT OF DELHI
CASE STUDY

- USED IN CONSTRUCTION OF ADDITIONAL OFFICE COMPLEX FOR SUPREME COURT OF INDIA
- C & D BLOCKS OF SIZE 400X200X100 MM USED
- AROUND 18 LAKHS C & D BLOCKS USED
- SAVED LOT OF NATURAL RESOURCES
• SIZE OF C & D BLOCKS USED AT THE SITE WAS 400X200X100 MM
• WEIGHT PER BLOCK IS 15 TO 16 KG
• GRADE OF CONCRETE M-10
• COMPRESSIVE STRENGTH 10 TO 15 N/MM2
• WATER ABSORPTION 10 TO 12%
C & D BLOCKS
TESTING

• NO CODE IS AVAILABLE FOR MASONRY MADE BY C & D WASTE

• SPECIFICATION, TEST PROCEDURE AND ACCEPTANCE CRITERIA IS PRESENTLY GOVERNED BY IS 2185 PART-1 (THIS CODE IS FOR SPECIFICATION FOR CONCRETE MASONRY UNIT)
**TEST CERTIFICATE**

(This certificate is not valid without a hologram)

Sample: Concrete Blocks (400x200x100mm)

Ref. No.: 30/04/2016

Issued To: IL & FS Environmental Infrastructure & Services Ltd.
North DMC C & D Waste Recycling Plant
Gate No-1, Hanuman Mandir Road,
Near MCD Colony, Jangirpuri,
Delhi-110033

Report No.: 1011227
Report Date: 10/05/2016
Job Code: STRC/BM/1011227
Sample Received On: 30/04/2016
Sample Quantity: 21 pcs

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<th>S.No</th>
<th>Test</th>
<th>Result</th>
<th>Requirement IS: 2185(P-2) 1983</th>
<th>Test Method IS: 2185 (P-2) 1983</th>
<th>Conformity</th>
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<td>1</td>
<td>Avg. Block Density, kg/cm³</td>
<td>1669.2</td>
<td>Grade A 1600 Max</td>
<td>IS: 2185 (P-2) 1983</td>
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<td>2</td>
<td>Compressive Strength, N/mm²</td>
<td>1. 14.7, 2. 15.2, 3. 12.9, 4. 13.4, 5. 13.0, 6. 14.9, 7. 12.8, 8. 15.9</td>
<td>12.5 Min</td>
<td>IS: 2185 (P-2) 1983</td>
<td>Yes</td>
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<td>3</td>
<td>Water Absorption, %</td>
<td>Avg 14.1</td>
<td>Ind.Min 10.8</td>
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(1) The results listed refer only to tested samples and applicable parameters. Endorsement of product is neither inferred nor implied. (2) Total liability of our Lab is limited to the invoiced amount. (3) Samples will be destroyed after 15 days from the date of testing unless otherwise specified. (4) This report is not to be reproduced wholly or in part and cannot be used as an evidence in the court of Law and should not be used in any advertising media without our special permission in writing. (5) Report refer to the sample submitted to us and not drawn by Sigma Test & Research Centre unless mentioned otherwise.
ADVANTAGES

- BEST USE OF CONSTRUCTION DEMOLITION WASTE
- GOOD STRENGTH FOR MASONRY WORK
- IT HELPS IN SAVING NATURAL RESOURCES LIKE EARTH & COAL
- NO POLLUTION AS NO BURNING OF COAL/WOOD
- SAVE TIME BY GIVING MORE SPEED IN WORK
- BETTER BONDING IN FINISHING WORK
- FEWER JOINTS RESULTS IN CONSIDERABLE SAVING IN MORTAR AS COMPARED TO NORMAL MASONRY
PRACTICAL DIFFICULTIES

- IRREGULAR SUPPLY OF MATERIALS
- HEAVY IN WEIGHT
- NOT EASY TO HANDLE
- NOT SMOOTH FINISH
- WASTAGE IS MORE
- DIFFICULTY IN CUTTING TO PIECES
SIMILAR GREEN MATERIALS AVAILABLE

- PCC BLOCKS ARE AVAILABLE
- HOLLOW BLOCKS OF PCC ARE AVAILABLE
- AAC BLOCKS
- FLY ASH BRICK
IS 2185 IS PRESENTLY BEING USED FOR TESTING ETC FOR C & D WASTE BLOCK

THERE SHOULD BE SEPARATE IS CODE FOR C & D BLOCKS MENTIONING PROPER GRADES, DETAILS OF MATERIALS MINIMUM REQUIREMENT OF STRENGTH

TESTING PROCEDURE AND ITS ACCEPTANCE CRITERIA SHALL ALSO BE SPECIFIED IN THIS SEPARATE BIS CODE
C&D WASTE RECYCLED BLOCK MASONARY
COST COMPARISON

TRADITIONAL BRICK
- WEIGHT OF BRICK = 3 KG
- RATE PER BRICK = RS 5 + GST (5%)
- 500 BRICKS PER CUM
- RATE OF MASONRY RS. 7700 PER CUM

C & D BLOCKS
- WEIGHT OF BRICK = APPROX 15 KG
- RATE PER BRICK = RS 28 + GST (18%)
- 125 BLOCKS PER CUM
- RATE OF MASONRY RS. 7500 PER CUM
THANK YOU