Abstract the conventional concrete. overview due to

Abstract — The concrete is made up thecombination of fine aggregate, coarse aggregate, cement and water. And is themajor part of construction. A large amount ofdemolished waste is generated every year in India due to the rapid developmentof infrastructure.

Since a very small amount of this waste is recycled, soplacing this waste is a very serious problem because it requires a large amountof space. This paper is a part of comprehensive program where the experimental arecarried out to evaluate the effect of partial replacement of coarse aggregateby demolished waste concrete on compressive strength and workability of DAC(Demolished Aggregate Concrete). For that 7, 14 and 28 days compressivestrengths were recorded. The earlier study on this project shows that thecompressive strength of the DAC (Demolished Aggregate Concrete) somehowresembles with the conventional concrete if used in a proper amount up to 30%.

So in this study we have taken the demolished concrete aggregate 10%, 20%, 30%by weight of the approved coarse aggregate and the concrete cubes were casted bythat demolished concrete aggregate then further tests conducted such as workability, compressive strength for that DAC and the result obtained are found to becomparable with the conventional concrete. OVERVIEWDue to development ofindustries and urban areas waste generation is also increased, which isunfavorable for the environment. This study deals with recycling and reusing ofwaste concrete that is collected from buildings that are demolished andcollapsed. The main aim of this paper is to reduce the use of naturallyavailable river soil which is used as fine aggregate for producing concrete. Thereis a shortage of about 55, 000

million m3 due tothe construction of new infrastructure which shows that the demand of theaggregates in future increases. 750 million m3 additionalaggregate is required to fulfill the demand of the road sector.

There is a hugegap between the demand and the During construction waste generated is about 40kg per m2 to 60 kg per m2. Similarly, during renovation, repair and maintenance work 40 kg/m2 to 50kg/m2 waste is generated. The waste generated due to demolition of thebuilding is highest among all the wastes. If we demolish permanent buildingabout 300kg/m2 waste is generated and in case of demolition of semi-permanentbuilding 500kg/m2 waste is generated. The current concrete construction practice isthought unsustainable because, not only it is consuming enormous quantities ofstone, sand, and drinking water, but also two billion tons a year of Portlandcement, which releases greenhouse gases. Experiments has been conducted forwaste materials like- rubber tires, e-waste, coconut shell, blast furnace slag, waste plastic, demolished concrete constituents Environment must be protectedfor the survival of the human beings and other lives on earth. So environment consciousness, sustainable development and preservation of natural resources should be kept inmind during the construction work and industrialization.

At present, demolishedmaterial are dumped on land or treated as waste, which means they cannot beutilized for any purpose. If we put the demolished waste on land then thefertility of the soil get decreases. 23. 75 million tons of waste is generated annuallyin India in the year of 2007 according to Hindu Online. According to CPCB(Central Pollution Control Board) Delhi, 14. 5 million tons out of 48 million wasteis generated from the

construction waste from which only 3% is utilized in theconstruction of the embankment. In 100 parts of the construction waste 40 partsare of concrete, 30parts of ceramics, 5 parts of plastics, 10parts of wood, 5parts of metal and 10 parts of some other mixed compounds.

But the currentmethod adopted for the management of this waste are landfill mainly whichcauses a giant amount of the construction and demolished waste deposition andsuch huge amount affects the environment adversely. In India concrete, bricks, sand, mortar and tile residues are the main materials found in the demolishedwaste of buildings. This waste can be recycled or process in to the recycleddemolished aggregates which can be utilized in the concrete mixes. Demolishedconcrete aggregate (DCA) is generally produced by the crushing of concreterubble, then screening and removal of contaminants such as plaster, paper, reinforcements, wood, plastics. Concrete made with this type of recycled demolished concreteaggregate is called Demolished aggregate concrete (DAC). The main purpose of This study is todetermine the basic properties of DAC made of coarse recycled demolishedconcrete aggregate then to compare them with the properties of concrete madewith natural aggregates concrete. Fine recycled aggregate cannot be applied inthe concrete which is used for structures so we can ignore its amount 70-75%aggregates are required for the production of concrete.

Out of this 60-67% isof coarse aggregate & 33-40% is of fine aggregate. India is in the top 10 usersof the concrete due to rapid growth of infrastructure. As the demolishedaggregate is lighter than the natural aggregate so the concrete made from suchaggregate possesses low density

but the water absorption of the demolished aggregateis higher than the natural aggregate and the strength of the demolishedaggregates is somehow lesser than the natural aggregates. So concrete made fromthese demolished aggregate can be utilized where more strength is not required e. g.

in low rising buildings, in reinforced concrete pavements etc. MATERIALSAND METHODOLOGYDemolished waste: Demolishedconcrete waste is collected from /residential building in Rajatnagar Bhopal(m. p.).

It is light grey in color. Fig(a)DemolishedConcrete Aggregate Properties ofDemolished Aggregates: i. Specific Gravity: The crushed concrete is taken andis sieved through 4. 75mm sieve and the amount passed is taken for testing. The specific gravity in saturated surface dry condition of demolishedconcrete aggregate was found from 2. 45 which is less but satisfying theresults. If specific gravity is less than 2.

4, it may cause segregation; honeycombing & also yield of concrete may get reduced. ii. Water Absorption: The aggregate isimmersed in water for 24 hours and then the weight of the wet aggregate isnoted.

The aggregate is placed in an oven anddried for 24 hours and the dry aggregate weight is noted. This gives the waterabsorption of aggregate. The water absorption of aggregate is 1. 8%, which iscomparatively more than that of the natural aggregates.

The DCA from demolishedconcrete be made of crushed stone aggregate with old mortar adhering to it. Thus the water absorption results are

satisfactory. iii. Bulk Density: The bulk density ofdemolished aggregate is lower than that of natural aggregate, thus results arenot satisfactory; due to low Bulk Densitythe mix proportion gets affected. iv. Crushing and Impact Values: The demolishedaggregate is comparatively weaker than the natural aggregate against differentmechanical actions. As per IS 2386 part(IV), the impact and crushing values for concrete wearing surfaces should notexceed 30% &for other than wearingsurfaces 45% respectively.

The crushing & impact values of recycledaggregate satisfythe BIS specificationslimit. From crushing and impact test it is found that use of recycled aggregateis possiblefor application otherthan wearing surfaces. MIXDESIGN It is a method of calculatingthe proportions of coarse aggregate, fine aggregate, cement content and water content. It’s calculated by using the experimental values. DESIGN CONSIDERATIONS: Mix of concrete is M25 The fck valve is 25N/mm2 Consider maximum aggregate sizeis 20mm Degree of workability = 0. 90(compaction factor) Type of Exposure to be desinged= Mild Test data of materials(calculated in the laboratory): Specific gravity of cement = 3.

15 Specific gravity of CA = 2. 63 Specific gravity of RFA = 2. 84 Water absorption: CA = 0. 5 % RFA (recycled fine aggregate) = 1. 8 % Free (surface) moisture: CA = nil RFA = 1% Fine aggregates confirms tozone 2 IS-383 CALCULATIONS: TARGETSTRENGTH: For 5% risk factor constant is1. 65. standard deviation is taken from IS: 456 against M 25 is 4. 0.

ftarget = fck + 1. 65 x S= 25+ 1. 65 x 4. 0 = 31. 6 N/mm2 (target)Where, S = standard deviation in N/mm2 = 4 (as per table -1 of IS 10262- 2009) W/C

RATIO: From Table 5 of IS 456,(page no 20)Maximum water-cementratio for Mild exposure condition = 0. 55Based on experience, adopt water-cement ratio as 0. 5.

0. 5 <0. 55, hence OK. QUANTITYOF COURSE AND FINE AGGREGATE: CA = 1181. 65kg FA = 579. 80 Kg Cement ContentsWater-cement ratio = 0.

53water content = 191. 55 kg /m3Cement content = Table 5 of IS 456, Minimum cement Content for mild exposure condition = 300 kg/m3383. 24 kg/m3 > 300 kg/m3, looks good300 kg/m3 is the minimum cement content required for this mixdesign which is less than 383.

2 kg/m3. So the cement content taken = 383. 2 kg/m3.

As per 8. 2. 4. 2 of IS: 456Max cement content = 450 kg/m3 MIX PROPORTIONS: The mix proportion of M25 found to be: Cement Replaced aggregate Coarseaggregates 383. 2kg 579.

80 kg 1181. 65 kg 1 : 1. 6

: 3. 2 Quantities required for the mix per bag of cement: The mix is 0. 50: 1: 1. 6: 3. 2 For one bag of cement, thequantity of materials are worked out as below: Cement = 50 kg R.

F. A. = 77. 5 kg CA = 159 kg Water = 25 lit CONCRETETEST (fresh): SLUMP CONE TEST: This test is used to measure the properties of fresh concrete. This is anempirical test that measures the workability of fresh concrete.

It is used todetermine the consistency of the concrete. True slump achieved. Slump 300mm Compaction factor 0. 95. High workabilityconcrete, for

sections with congested concrete, not normally suitable forvibration, Concrete Mixes Conventional Cubes: Volume of each cube = 3. 375 x 10-3 m3 Volume of 3 cubes = 10. 125 x 10-3 m3 Quantity of materials required (considering 10 % loss) Cement = 5 kg Sand = 7. 7 kg Coarse aggregates = 15.

7 kg Water = 2. 5 litThe mix design is calculated and the amount of aggregate need for 9 cubesis calculated. The mix is done by hand by adding water at different interval COMPRESSIVESTRENGTH: Test is done for compressive strength of the concrete for 7, 14 and 28days, and the average value is taken. The compression is done in a compressivemachine and the values are drawn in a graph along with the correspondingstrength of normal M25 grade concrete at the same days of curing.
Compressive strengthN/mm2 CONCLUSION: This paper depicts the benefits of replacement of aggregates withdemolished waste concrete. The results of the compressive strength iscomparatively satisfactory than the conventional concrete.

So by replacing thenatural aggregate with the replaced waste can reduce the amount of pollution aswell as preserve nature at all cost. This shows that demolished concrete can bereused in a more effective manner without causing any damage to theenvironment. Demolished aggregate has low bulk crushing, density and impactstandards and higher water absorption as compared to natural aggregate. The tests conducted ondemolished aggregates and results compared with natural coarse aggregates were satisfactoryas per IS 2386. Compressive strength of replaced aggregate concrete isrelatively lower up to 8% than natural aggregate concrete. Using

demolishedaggregate concrete and replacing conventional aggregates as base material forroadways reduce the pollution involved in trucking material. Concluding we can saythis type of concrete can be used in road constructions, parking lots, low loadbearing places. FUTURESCOPE1.

Sustainabledevelopment of structures can beachieved by using wastedemolished concreteaggregate. 2. We can use theplastic waste also as a coarseaggregate in concrete.

3. Fine aggregate in thedemolished concrete can alsobe utilized in future. 4. Demolished bricks andstones possess the sameproperties as coarseaggregates. REFERENCES 1 Katz, A. (2003), " propertiesof concrete made with recycled aggregate from partially hydrated old concrete", Cement Concrete Research, 33, 703-11 2 " Demolition andReuse of Concrete and Masonry ", proceedings of Third International RELIMSsymposium, 1993 3 Yuan, H.

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