

UTILIZATION OF WASTE MATERIAL IN CONSTRUCTION – SUSTAINABLE URBANIZATION

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Abstract - This paper describes the introduction of sustainability, its importance, construction waste materials, how to reuse these waste materials, bad affect of these wastes in our environment, benefits & application.

Key Words: Sustainability, Waste-plastic, Marble-dust, Ecology, Recycled aggregate.

1. INTRODUCTION

Sustainability itself a complex work. Sustainability is a circular process, which start with collect of waste material & end with reuse the waste.

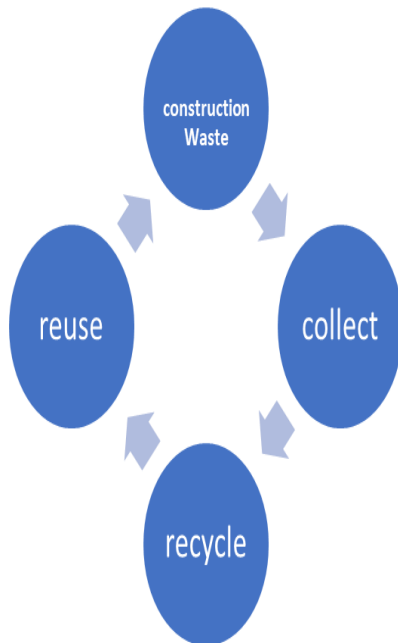


Fig -1: Sustainability cycle

In other word, sustainability means comfortable environment, sustainability means conservation & preservation of resources. There are few wastes that we can reuse in construction activities like (1) Waste Plastic (2) Marble Dust (3) Recycled Aggregate.

1.1 Different type of waste material

Use of waste products is not only a partial solution to **environmental and ecological problems**; it significantly **improves the quality of structure**, and consequently **the properties of concrete**.

Because of the above factors, we need to increase the demand for better understanding the behavior of waste material properties.

Origin - Plastic- solid waste material (domestic Waste), Marble dust- Cutting of Marble, Blast furnace slag, Fly ash, silica fume - Power Plants, Recycled aggregates – Demolition Of construction.

2. WASTE-PLASTIC

Plastic waste consisting bags, milk, fruit juices, bottle caps, film wrapping for biscuits, microwave trays, yoghurt pots, clear egg packs, bottle caps.

These waste-plastic can be used in bituminous road – these kind of road called as plastic road.

Material used-

- (1) AGGREGATE: - Aggregate of 20mm, 10 mm.
- (2) Stone Dust and Lime as Filler
- (3) BITUMEN: - 60/70, 80/100 grade bitumen.
- (4) WASTE-PLASTIC: - Waste plastic in the shredded form (PVC is not Used)

2.1 Methodology:

- (1) Segregation- separation of plastic from waste
- (2) Cleaning & drying of plastic
- (3) Melting of plastic at a temperature of 165°C
- (4) Mixing with bitumen - Amount of plastic to be added is @8% of bitumen

- (5) The road laying temperature is between 110°C to 120 °c. And the rollers are used have capacity 8-ton generally

2.2 Benefits:

- (1) Environmental benefits & ecofriendly
- (2) Landfill space increase
- (3) Sustainability
- (4) MSWM (Municipal Solid Waste Management)
- (5) Tensile strength increased
- (6) Cost saving

3. RECYCLED AGGREGATE

Recycled aggregates are the aggregates obtained from construction and demolition waste (CDW), from residential, commercial, industrial structures or from pavements.

Uses: For making pedestrian used in security cabin, land filling, land-scaping, bottom surface of OHWT RCC sheet, for making surface of RO plant, water tank.

Benefits: Conserves use of natural resources- as it replaces amount of natural aggregate, means sustainability.

4. MARBLE DUST

Marble has been commonly used as a building material. Marble dust is a waste item formed during the creation of marble. A large quantity of powder is generated during the cutting process.

Bad affects of marble dust: Leaving these waste materials to the environment directly can cause environmental problems such as increases the soil alkalinity, affects the plants, affects the human body etc.

Usage:- Marble powder can be used as an admixture in concrete, so that strength of the concrete can be increased.

Marble dust is mixed with concrete, cement or synthetic resins to make building stones, sculptures, floors.

4.1 Marble dust as filler:

Marble dust can be used either to produce new products or as an admixture so that the natural sources are used more efficiently and the environment is saved from dumpsites of

marble waste. Many studies have been conducted that the performance of the concrete containing waste marble dust or waste marble aggregate, such as its addition into self-compacting concrete as an admixture (replace with marble dust) or sand (replace with marble dust) as well as its utilization in the mixture of asphaltic concrete and its utilization as an additive in cement production, the usage of marble as a coarse aggregate as well as fine aggregate passing through 1 mm IS sieve.

Means- marble dust can be used in self compacting concrete partial replace with admixture or sand. marble dust can be used in asphaltic concrete partial replace with admixture or sand. marble dust can be used in cement production as an additive.

Generally waste marble dust has been replaced with either all of the fine aggregate (0 - 4 mm) or passing 1 mm IS sieve (as per studies of various literature). Some studies concerning the utilization of marble dust, which is obtained as a by-product of marble cutting or manufacturing processes in the factories those operating in some region as a fine sand aggregate while mixed in concrete does not achieve normal strength ,that's why we will not reached in a conventional conclusion.; in other words, additional studies and investigations are necessary to fully evaluate the potential usages of this waste material. Therefore, the aim of this current study is to avoid the environmental pollution.

4.2 Marble dust in industrial brick:

The use of waste marble dust as an additive material in addition, the usage of marble wastes for industrial bricks has important vital role on the usage of waste marble powder within the brick production in conjunction with a good contributions to economy and ecology of the country.

5. CONCLUSIONS:

- (1) Minimum waste promotes not only reuse and recycling, but also and more importantly, promotes prevention
- (2) Environmental protection is enhanced by reducing hazardous and solid wastes to nature
- (3) Some times cost effective
- (4) Promotes sustainability
- (5) ecofriendly

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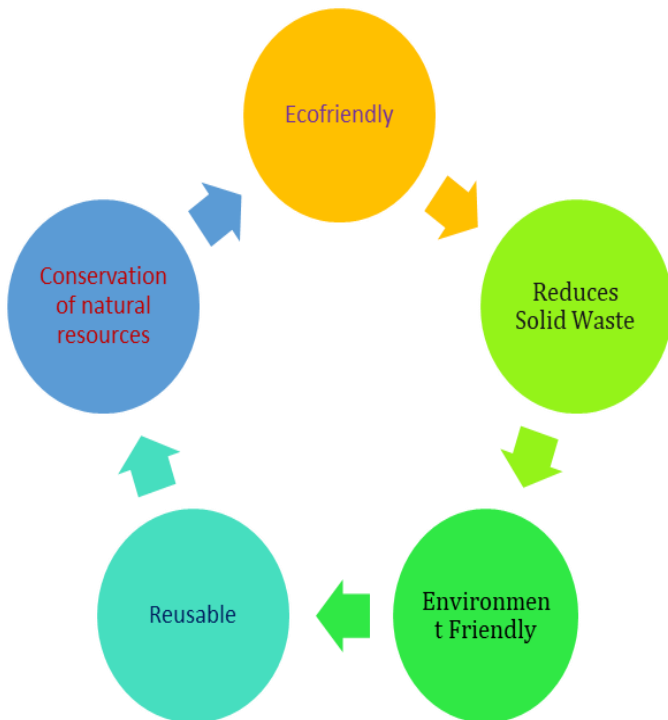


Fig -2: Meaning of sustainability