REUSE OF CONCRETE AND MASONRY WASTE MATERIALS IN CONSTRUCTION TO MINIMIZE ENVIRONMENTAL DAMAGES DUE TO QUARRYING

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Received April 29, 2006   Accepted June 8, 2006

ABSTRACT

The need for demolition, repairs and renewal of concrete and masonry structures is rising all over the world, more so in the developing countries. It is highly desirable that the waste materials of concrete and bricks are further reutilized after the demolition of old structures in an effective manner especially realizing that it will help in reducing the environmental damages caused by excessive reckless quarrying for earth materials and stones. Secondly, this will reduce pressure on finding new dumping ground for these wastes, thus further saving the natural environment and eco-systems. In this regard, the concerns expressed at Earth-92 conference held at Rio, Brazil, are very appropriate and thought provoking.

Durability, reliability and adequate in service performance of these reused waste materials over the stipulated design life of designed structures are of paramount importance to Structural Designers. This paper critically examines such properties in reused concrete and brick masonry waste materials and suggests suitable recommendations for further enhancing life of such structures, thereby resulting in sufficient economy to the cost of buildings.


INTRODUCTION

It is absolutely essential to protect our environment and stop reckless destruction of our planet, Earth. Such damage has been taking place progressively which is now leading us towards many catastrophes and natural disasters. After many years of environmental neglect, this crisis has been recognized. The challenge that confront us are increasingly been measured in Global rather than National terms. Environmental damage or harm in one country, may be on account of any activity, like deforestation, excessive mining, spread of dangerous toxins, depletion of ozone

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layer, pollution of rivers and ocean affect the health of entire planet. It is universally accepted that there should be environmentally sound and sustainable development. With this aim in view, it is appropriate to examine the various possibilities of reuse of waste materials, more so, in civil engineering construction.

Need for Utilization of Concrete and Masonry Waste Materials

Civil Engineering construction activity is always associated with new development and projects. This can be a housing project, industrial infrastructure power plants, docks and harbour works etc., large quantities of traditional construction materials like earth, sand, stones, bricks, cement concrete, steel, aluminum, wood are used. The demand for these materials is increasing in geometric progression. Sustainable development means a commitment to finding and using resources that are renewable. With this philosophy in view, there is an urgent need for optimum reuse of building waste materials available after demolition and renewal of old structures. Also other industrial and agro-waste materials can be appropriately utilized in civil construction works. Therefore, the economic viability of such applications along with the durability of these materials needs further examination. An important obvious advantage is that with recycling of stone, aggregate, bricks etc. quarrying and mining for stones, and will be reduced. Thus the earth surface can be further saved and ecological disturbances on account of this activity will be reduced. For example, raw material for bricks manufacturing is totally earth based. Reuse of bricks means lesser possibilities of removing fertile earth, soil grass cover and forestation. This will minimize environmental destruction in over all terms. With large volume of building works, and to meet its demand, it is observed that there can be large uncontrolled growth of brick kilns, contributing to environmental deacay.

Potentials of Concrete and Masonry Waste Material for Further Reuse in Building Works

Bulk of mass in cement concrete is provided by coarse and fine aggregates produced from rocks and stones. Due to removal and demolition of old structures, aged houses, factories etc. substantial quantities of these wastes are available, more so, on a large urban renewal projects. A good quantity of old building bricks is also available in such projects. At times, it creates problem for appropriate disposal. Therefore, it is worthwhile for exploring the possibilities of application of these materials for further reuse. The extent of deterioration in these materials due to chemical action, environmental exposure and loadings can be assessed and suitable selection can be made to identify reusable waste materials. From various studies it is observed that about 70% of basic stones, aggregates and old bricks can be salvaged from the demolition works for its further reuse, mostly in secondary non-structural applications.

Some of the important possible applications are as follows:
1. Coarse aggregate from demolished concrete works can be properly washed under water jet, screened and then can be used in lean concrete mixes, especially for base courses in flooring, foundations, paving etc. These are mixed with like mortar and can be used for boundary walls, site leveling and filling works.
2. If the recycled aggregates are fund clean and sound from hardened old cement paste, these can be further used with new concrete mixes. Care must be taken that these are totally free from deleterious substances and have not crushed or deteriorated due to weathering or under the action of load.
3. Broken bricks and bricks available form demolition can again useful for walls if the extent of damage to their dimension is not excessive and are free from presence of cracks etc. Generally, the uses of such
bricks are limited in followings and fillings, partition wall, compound walls etc. Brick bates can be crushed and smaller size of 20 mm. and below can be used as light weight aggregate in mortars. Clean and dimensionally stable bricks won from sites are suitable are suitable for low cast houses. Care should be taken to remove all old mortar carefully before applying into fresh construction.

Limitations in Use of Building Waste Materials

There are several limitations and more research is needed to explore further possibilities. The economics of reuse must be checked. The presence of uncombined cement and other deleterious substances can create problems. There may be cracked surfaces left in bricks and aggregates which may create weak zones. The durability of such recycled concrete is presently difficult to assess. Therefore, the present uses are limited to non-structural application and construction works.

CONCLUSION/SUGGESTIONS

1. The idea of reusing the waste material is very exciting and encouraging specially when it will be helpful in minimizing destruction to earth’s crust and green forest cover by virtue of reduced mining.

2. By suitable recycling and reuse, these waste materials will not contribute to waste loads at dumping and disposal sites.

3. Construction industry can contribute towards its commitment to protection of environment by encouraging use of recycled concrete stones and bricks. Also the importance of ‘Environmental Impact Study’ is duly acknowledged during planning stages of any project or work and as an after thought later on.

4. Durability aspects of recycled building materials should be further examined in great details.

5. There is enough scope for further research on this topic which will further contribute towards saving of earth and its resources.

REFERENCES


