DEMOLITION OF STRUCTURE USING IMPLOSION TECHNOLOGY AND REUSE WASTE - A CASE STUDY

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RELEVANCE :
An implosion is an event where something collapses inward, because the external atmospheric pressure is greater than the internal pressure. For example, if we pumped the air out of a glass tube, it might implode. When a building is surrounded by other buildings, it may be necessary to "implode" the building, that is, make it collapse down into its foundation. We can demolish a stone wall with a sledgehammer, and it's fairly easy to level a five story building using excavators and wrecking balls. But when we need to bring down a massive structure, say a 20-story skyscraper we have to haulout the big implosion guns. Explosive demolition is the preferred method for safely and efficiently demolition of larger structures.

The basic idea of explosive demolition is quite simple if we remove the support structure of a building at a certain point, the section of the building above that point will fall down on the part of the building below that point. If this upper section is heavy enough, it will collide with the lower part with sufficient force to cause significant damage. The explosives are just the trigger for the demolition. It's gravity that brings the building down.

Demolition blasters load explosives on several different levels of the building so that the building structure falls down on itself at multiple points. When everything is planned and executed correctly, the total damage of the explosives and falling building material is sufficient to collapse the structure entirely, so clean-up crews are left with only a pile of rubble. Now day-by-day increasing population in the world results to increase in the needs for desire of human beings. And that are going to results in creating the waste from all the sectors or in all the ways.

In case of construction and demolition waste is generated whenever any construction/demolition activity takes place, such as, building roads, bridges, flyover, subway, remodeling, subways etc. It consists mostly of inert and non-biodegradable material such as concrete, plaster, metal, wood, plastics etc. A part of this waste comes to the municipal stream.

This case study shows the construction and demolition model for Kohinoor Steels Pvt. Ltd., Kirloskarwadi, Sangli It covers the different wastes, which are occurred for construction activities in Company’s area, and it shows with demolition model and also shows the demolition waste procedures to get the beneficial reuse of the waste. Here the reference is taken with international case studies from the different countries.

LITERATURE REVIEW:
1. International Journal of Emerging Technology and Advanced Engineering (ISSN 2250-2459, ISO 9001:2008 Certified Journal, Volume 3, Issue 4, April 2013) Demolition of any structure is a ground to earth technique which means destroying down or falling down of a building with the help of equipments, machineries explosives or with manual techniques without affecting the surrounding. Demolition is a simple process for small buildings or houses. The building is brought down either manually or mechanically using large hydraulic equipment: elevated work platforms, cranes, excavators or bulldozers. Demolition work is to be performed safely and with number of different steps involved before and during the execution of a demolition process. The various steps involved before the demolition process includes surveying the site of demolition, removal of hazardous materials if any, and preparation of demolition plan with techniques to be implanted, stability report and the precautionary safety measures to be taken for the workers and the surroundings. Equipments used for these demolition activities are like sledge hammer or rammers; excavators, bulldozers, tearing balls etc. and main explosives used are like dynamites and RDX. When explosive are used for the demolition, it is known as Implosion, which is generally preferred for high and tall towers


The author deal with recycling of the steel and other materials made it possible to do additional demolition by using these funds. Therefore, finding ways to maximize the recycle value of materials became a key factor in the pre-demolition characterization and implementation strategy. Due to the large number of facilities, they were sorted into smaller manageable groupings. Grouping the facilities together in manageable packages based on customer defined priorities allowed for the D&D to be implemented as funding was made available.

3. NYC Department of Design & Construction,”
Construction and demolition Waste model- DDC Recycling and Reusing Construction & Demolition Waste

Waste management is not just a money issue, waste prevention; reuse and recycling can not only save money, but also generate broad environmental benefits, including the conservation of natural resources. Reuse and waste prevention reduce the air and water pollution associated with materials manufacturing and transportation. This saves energy and reduces attendant greenhouse gas production. The recycling of many materials requires less energy than production from virgin stock, and can also reduce transportation requirements and associated impacts.


Recent deconstruction demonstration projects show that high diversion rates may be achieved. Deconstruction minimizes contamination of demolition debris; however, it is labor intensive, and generally requires more time than traditional demolition. The methodology used for this study combines national Census Bureau data on construction industry project activity with point source waste assessment data (i.e., waste sampling and weighing at a variety of construction and demolition sites) to estimate the amount of C&D debris produced nationally. Because of the lack of point source waste assessment data from roadway, bridge, and land clearing projects, this study was limited to building-related wastes.


Techniques and tools for dismantling existing structures are under development, research to support deconstruction is ongoing at several institutions, and some government agencies are realizing the advantages of deconstruction over demolition by funding research in area of deconstruction and materials reuse.

6. Rupel Symonds,” Recycling Construction and demolition wastes”, the Boston Society of Architects, April 2005

“Sustainable building” has become a national catchphrase. In architects’ offices and on construction sites around the country there’s increasing emphasis on reducing the environmental impacts of renovation and new construction.

OBJECTIVES OF PROPOSED WORK :

The objectives of the work are as follow,

- To study the suitability of an implosion technology for demolition of building.
- Evaluate and identify demolition options for multistoreyed building.
- To perform economic comparison of an implosion technology with explosion technology and provide suitable method to minimize cost of demolition of building.
- To provide effective methods and equipments to control dust, noise and vibrations.
- To find and provide a feasible solution for reuse of demolition waste through better management.

METHODOLOGY:

In the context of this project it is advisable and worthy to note that Kohinoor Steels Pvt. Ltd., Kirlloskarwadi, Sangli, use this method of demolishing would be proved very suitable and useful, most of group’s assets i.e. structures. The basic idea of implosion is quite simple, if we remove the support of structure of a building at a certain point, the structure of a building above that point will collapse. If the upper section is heavy enough, it will collapse on the lower part of the structure with force to cause significant damage. The explosives are used in these methods are such that the whole structure should fall towards its centre of its gravity by just triggering off the explosive in designed manner for demolishing the structures. The true meaning of implosion of structure is to fall on its foundation, but in some cases structures are given desired direction of fall during demolition in order to protect some important existing structures.

The advantages of implosion technology make it very suitable for multi-storeyed structures.

Pre-planning of demolition activity:

The different steps before the start of a demolition process are:

A) Surveying of site:

1. Building surveying
   a) Record Drawings
   b) Survey of Buildings
   c) Hazardous Materials on and in surrounding
2. Structural surveying
B. Removal of hazardous materials from the site.
C. Preparation of plan along with strategy to implement.

C.1) A detail plans showing:

   a) The building location to be demolished
   b) Topography of the site with its ground level contours and sections of the slopes and ground supported by the building where appropriate in detailed
   c) Details of ground removal or backfilling
   d) The distances from the building to be demolished to its adjacent buildings, streets, Structures and significant street furniture.

C.2) A Detail plans showing the steps for the demolition.

D. Stability report from local authorities.
E. Safety measures to be used.

A) DETAILS OF CASE STUDY TAKEN IN TO CONSIDERATION FOR DEMOLITION:

In Western Railway, Mumbai division, there was a G+3 storied building, numbered 25/T, constructed in 1924 by BB & C1 Railway as a first cement concrete residential structure in Mumbai. It was having 80 Nos. (4×20) type I quarters with a total land area.
about 430sqm. The total height of the building was 13.2m above rail level. The structure completed its designed life and the existing condition of the building was so deteriorated that there was no option, but to demolish the same for safety of running trains and adjoining residents.

There were four running lines just adjacent to structure on east side, the face of building being 4.55m away from track centre. There was a supporting portal for five OHE live conductors at a distance of 5.80m from face of building towards north side. There was a stone masonry boundary wall at a distance of 2.80m from the face of building. In addition to above mentioned railway assets, there was a 40 storied structure about 100m away from the building to be demolished and a diamond factory on the east side having an exterior glazed building.

**Necessity to use Implosion technology:**
Since the structure was very near to the running track, which requires continuous track protection / traffic block, resulting in long disruption to running traffic, the manual method of demolition was not considered suitable. The mechanical method was not suitable, as there was no space to bring heavy machinery near the structure to work at a height of 13.5m in view of the above, it was considered ‘implosion’, which brings the building down on its footprint in a very less time was considered suitable.

**WORK FLOW CHART:**

1. **Recognition of need**
2. **Identify the Alternatives**
3. **Evaluate**
4. **Analysis of C & D Debris**
5. **Results And Discussion**
6. **Conclusion**

**Work flow chart**

1. Layout for ground floor:

2. Layout for First, Second, Third floor:

**REFERENCES:**