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Construction And Demolition Waste Management

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Abstract: Construction waste management and demolition are two critical processes in the construction industry that aim to reduce the environmental impact of building projects. Construction waste management involves the planning, monitoring, and control of waste generated during construction activities, while demolition involves the systematic dismantling and removal of buildings and structures. The management of construction waste has become increasingly important in recent years due to the growing concern about the impact of construction on the environment. The construction industry generates a significant amount of waste, including materials such as concrete, wood, metal, plastics, and glass. If not managed properly, these materials can have negative impacts on the environment, including soil and water contamination, air pollution, and greenhouse gas emissions. Effective waste management strategies, such as recycling and reusing materials, can reduce the amount of waste sent to landfills and minimize the environmental impact of construction projects. Demolition is another important aspect of the construction industry that requires careful management. Demolition activities can generate a significant amount of waste and dust, which can pose health risks to workers and nearby communities. To minimize these risks, demolition activities must be planned and executed with care, following strict safety guidelines and environmental regulations. Proper disposal of demolition waste is also critical to minimize the impact on the environment.

I. INTRODUCTION

The construction industry is a significant contributor to the global economy and plays a crucial role in shaping our built environment. However, it also generates a substantial amount of waste, which can have negative environmental impacts. Construction waste management and demolition are two important processes that aim to minimize these impacts and promote sustainable construction practices. Construction waste management involves the planning, monitoring, and control of waste generated during construction activities. This includes the management of waste from building materials such as concrete, wood, metal, plastics, and glass, as well as from site preparation and excavation activities. The goal of construction waste management is to reduce the amount of waste generated, minimize its environmental impact, and increase the reuse and recycling of materials.

Demolition, on the other hand, involves the systematic dismantling and removal of buildings and structures. This process can generate a significant amount of waste and dust, which can pose health risks to workers and nearby communities. As a result, demolition activities must be planned and executed with care, following strict safety guidelines and environmental regulations. Proper disposal of demolition waste is also critical to minimize the impact on the environment. Effective construction waste management and demolition practices are essential for sustainable construction projects. By reducing waste and minimizing the impact on the environment, these practices can help create a healthier and more sustainable future for all. In addition, sustainable construction practices can also lead to cost savings and increased efficiency in the construction process. In recent years, there has been growing awareness about the importance of sustainable construction practices, and many governments and organizations have implemented policies and regulations to promote them. For example, in the United States, the Environmental Protection Agency (EPA) has established guidelines and best practices for construction waste management and demolition. Similarly, the European Union has set targets for the reduction of construction waste and the increase of material reuse and recycling. In conclusion, construction waste management and demolition are critical processes in the construction industry that play a significant role in promoting sustainable construction practices. By reducing waste, minimizing environmental impact, and promoting material reuse and recycling, these practices can help create a more sustainable future for our built environment.

II. SUMMARY

This passage discusses the importance of construction waste management and demolition in promoting sustainable construction practices. The construction industry generates a significant amount of waste, including materials such as concrete, wood, metal, plastics, and glass, which can have negative impacts on the environment if not managed properly. Construction waste management involves the planning, monitoring, and control of waste generated during construction activities, while demolition involves the systematic dismantling and removal of buildings and structures. Effective waste management strategies, such as recycling and reusing materials, can reduce the amount of waste sent to landfills and minimize the environmental impact of construction projects. Demolition activities can generate a significant amount of waste and dust, which can pose health risks to workers and nearby communities. Proper disposal of demolition waste is critical to minimize the impact on the environment. The passage also mentions some of the benefits of recycling concrete, including cost savings, no disposal fees, and reduced truck traffic.

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III. METHODOLOGY

Data Collection:

1. Collection of research papers on construction waste management and demolition.
2. Determining the case studies
3. related to project topic.
4. Selection of appropriate site in accordance to project topic

Study of effective use of planning principles

1. Analysis and detailed study of research papers.
2. Prepare a actual plan for existing project
3. Overview of all situations while executing the project

Analysis of study:

1. While analysis of the research papers,Many problems are defined.
2. By analysing the all above data , Found that this project can used for different situations
3. The Project can be applicable for reuse of construction waste.
4. And also the project can be applied on Sea where occurred

Overview of all situations while executing the project
Adaptation, Sustainability, Efficiency, and Management (ASEM)

Methods design strategies

Recycling of waste concrete is done to reuse the concrete rubble as aggregates in concrete. The recycled aggregates have less crushing strength, impact resistance, specific gravity and has more absorption value as compared to fresh aggregates.

Necessity of Concrete Recycling: Millions of tonnes of waste concrete is generated every year around the world due to following reasons:

1. Demolition of old structure,
2. Destruction of buildings and structures during earthquakes and wars,
3. Removal of useless concrete from structures, buildings, road pavements etc.
4. Waste concrete generated due to concrete cube and cylinder testing, destructive methods of testing of existing structures etc.

Advantages of Concrete Recycling: Usually demolished concrete were shipped to landfills for disposal, but due to greater environmental awareness, the concrete is being recycled for reuse in concrete works. There are a variety of benefits in recycling concrete rather than dumping it or burying it in a landfill. Keeping concrete debris out of landfills saves space there. Other Benefits of Recycling of Concrete are:

- Local Product – Local Sources
- Reduces Truck Traffic
- Alternative to a Non-Renewable Resource
- Cost Savings
- No Disposal Fees
- Better Trucking Utilization (Reduced Costs)

Using recycled material as gravel reduces the need for gravel mining. There are also economic benefits. Recycled concrete is a construction material that the community does not need to pay for; those who generated the concrete waste pay a fee to have it recycled.

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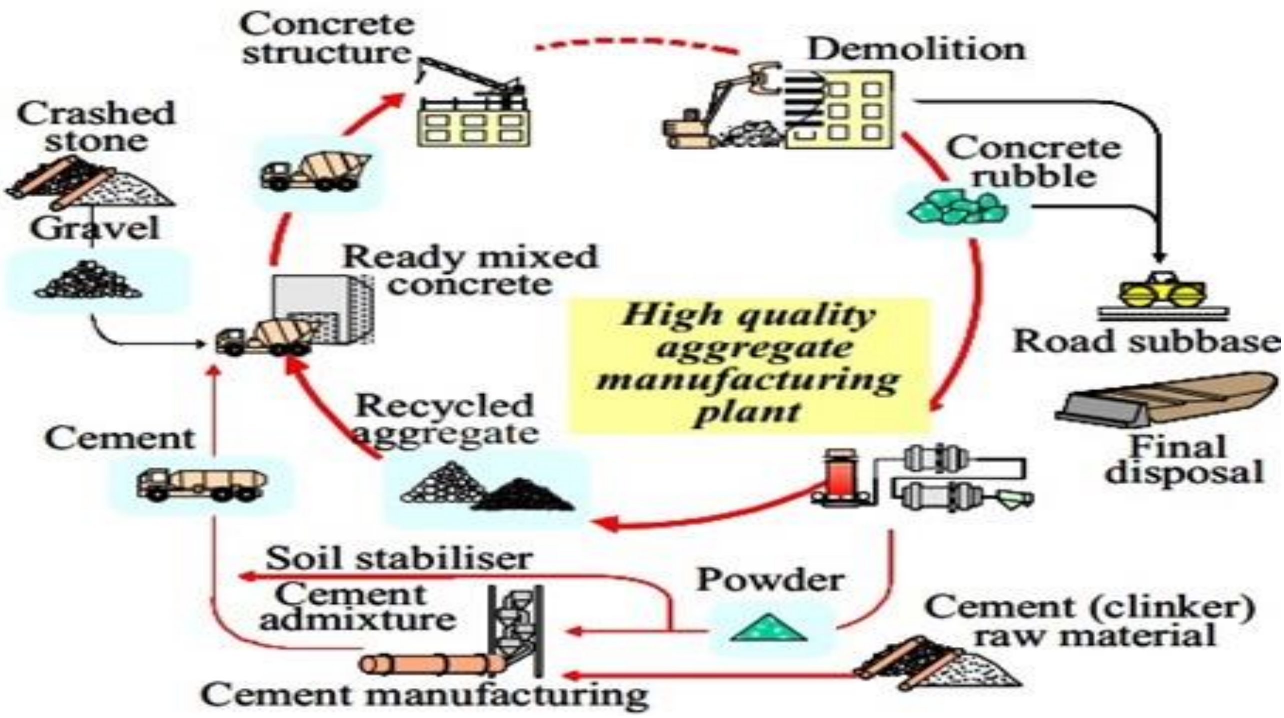

Quality of recycled aggregate and its concrete: The strength of recycled aggregate concrete is about 10 to 15 percent less as compared to concrete with fresh aggregate. However suitable mix designs may be made and reliable results obtained. The mix requires a slightly higher quantity of cement or using admixtures to reduce water requirement. Recycled aggregate concrete can be safely used as plain concrete. With proper corrections in mix design, it can be used for R.C.C. works also.

COMPARISION OF CONCRETE AGGREGATE AND NATURAL AGGREGATE WITH SOME TESTES

IMPACT TEST

The impact test is a type of quality control test for highway pavements that is used to determine the suitability of aggregates for use in highway pavement construction. Aggregates used in road construction should be strong enough to resist abrasion and crushing and also the impact load.

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PROCEDURE

- **Step 1 –** First, the aggregate sample sieve through 12.5mm sieve and collect it which is retained in 10mm sieve.
- **Step 2 –** Now, the sample should be dried through the oven up to 4 hours at 100 deg to 110 deg.
- **Step 3 –** Then, the aggregate sample should be filled in the metal cup by 3 layers. Each layer should be tamped 25 times by the tamping rod. Remove the excess sample from the metal cup.
- **Step 4 –** The net weight of the aggregate sample, which is in the metal cup, should be measured as W1.
- **Step 5 –** Now, the weighted sample filled in the metal cup and should be tamped gently.

- **Step 6 –** Then the metal cup is placed horizontally in the impact machine and locks it to ensure that it does not oscillate.
- **Step 7 –** Release the hammer of the Impact test machine, which falls freely on the sample. It should be done 15 blows at less than 1-sec interval.
- **Step 8 –** Then remove the metal cup from the machine & sieve the aggregate through 2.36mm sieve.
- **Step 9 –** Now weigh the collected samples as W2.

RESULT

Ratio of Impact Value = (W2/W1) x 100
This test must be done at least for two samples. The average value of the two samples is the **Impact Value of Aggregate**.

Actual Test Results

Procedure	Test 1 weight in grams	Test 2 weight in grams
Aggregate passing through 12mm sieve (W1)	430g	440g
Aggregate passing through 10mm sieve (W2)	320g	320g
Aggregate passing through 2.36mm sieve (W3)	110g	120g
formula	W3/W1x100= %	W3/W1x100= %
Calculations	110/430x100=25.58%	120/440x100=27.27%
Mean	25.58+27.27/2 =26.425	

SI	Aggregate classification	Impact Value
1	Strong	10% to 20%
2	Satisfactory	20% to 30%
3	Weak	above 35%

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according to our test reports report shows that the percentage of aggregate is 26.425 that means the aggregate is satisfactory so that we can use this aggregate as a construction material in the roads

ABRASION TEST

The Los Angeles abrasion test is a commonly used method for testing the hardness of aggregates such as gravel and rocks. The test involves subjecting a sample of the aggregate to abrasion and impact in a rotating steel drum containing steel spheres.
Here is a general procedure for conducting the Los Angeles abrasion test using a machine:

1. Obtain a representative sample of the aggregate to be tested. The sample should be large enough to provide a minimum mass of 5000g when the material is sieved to the appropriate size.
2. Weigh the sample and record its mass.
3. Place the sample in the Los Angeles abrasion testing machine drum along with a specified number of steel spheres. The drum should be rotated at a speed of 30-33 rpm for a specified number of revolutions (usually 500 or 1000).
4. After the specified number of revolutions, remove the sample from the machine and separate it into individual size fractions using standard sieves.
5. Weigh each size fraction and record its mass.
6. Calculate the percentage loss in mass for each size fraction as follows:

% loss = (initial mass - final mass) / initial mass x 100

7. Calculate the overall percentage loss in mass for the sample by taking a weighted average of the percentage losses for each size fraction.
8. Compare the overall percentage loss in mass to specified limits or standards to determine if the aggregate meets the requirements for use in the desired application.

It is important to follow the specified procedures for the Los Angeles abrasion test to ensure accurate and reliable results. Additionally, it is important to properly maintain and calibrate the testing machine to ensure it is functioning properly.

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OBSERVATION AND RESULTS

Type of aggregate taken = Coarse Aggregate
Grade of the Sample used = Grade B
Original Weight of the Aggregate (W1) = 2500g
Weight of the aggregate retained on 1.70mm sieve (W2) = 2100g

Percentage Wear = W1 - W2/ W1 * 100
= 2500-2100/2500*100
= 16.00%

Type of work	Abrasion Value
For Wearing surfaces	≤30%
For Non Wearing surfaces	<50%

The abrasion test result of 16% indicates that the aggregate is moderately resistant to wear and tear. It may be suitable for use in certain applications, but may not be ideal for others that require higher durability and wear resistance.
To determine the specific areas where the aggregate can be used, it would be helpful to consider factors such as the type of project, the expected traffic and usage, and the environmental conditions.

Some potential applications for an aggregate with a 16% abrasion test result could include:

1. Roadways: The aggregate can be used in the construction of lower traffic volume roads where wear and tear is not expected to be severe.
2. Concrete surfaces: The aggregate can be used in the production of concrete for low-traffic surfaces such as sidewalks or residential driveways.
3. Landscaping: The aggregate can be used in landscaping projects such as decorative walkways or garden paths.

It's important to note that the final decision on the suitability of the aggregate for a particular application should be based on a thorough evaluation of all relevant factors and considerations.

The process of use of demolished concrete in roads

The use of demolished concrete in roads is becoming increasingly popular due to its benefits in terms of sustainability, cost-effectiveness, and reduced waste. The process of using demolished concrete in roads involves several steps that must be followed to ensure that the resulting road is of high quality and durability.

1. Collection and Preparation of Demolished Concrete The first step in using demolished concrete in roads is the collection and preparation of the material. This involves the demolition and breaking down of existing concrete structures, such as buildings, bridges, and pavements. The demolished concrete is then transported to a crushing plant where it is processed into smaller pieces of a consistent size.

2. Sorting and Quality Control Once the demolished concrete has been processed, it is sorted according to its quality and size. This is important to ensure that the resulting road meets the required strength and durability standards. Quality control tests are also carried out to check the quality of the concrete, such as the compressive strength, water absorption, and abrasion resistance.

3. Mixing with other materials To improve the strength and durability of the road, the demolished concrete is usually mixed with other materials such as cement, fly ash, or slag. The ratio of these materials varies depending on the quality of the demolished concrete and the required strength of the road.

4. Lay the Base The next step is to lay the base for the road using the prepared mix of demolished concrete and other materials. The base layer must be compacted to ensure that it is stable and able to support the upper layers of the road.

5. Laying the Surface Course Once the base layer has been laid and compacted, the surface course can be applied. This

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layer is made up of a mixture of the prepared demolished concrete and other materials. The surface course is usually between 4 and 6 inches thick, depending on the traffic load and the strength required.

6. Compacting the Road After the surface course has been laid, the road must be compacted to ensure that it is stable and durable. The compaction process involves the use of heavy machinery such as rollers, which compress the road to ensure that it is level and free from any air pockets.

7. Curing the Road The final step is to cure the road to ensure that it is fully hardened and durable. This process can take several weeks, depending on the weather conditions and the thickness of the road. During the curing process, the road must be kept moist to prevent it from drying out too quickly.

In conclusion, using demolished concrete in roads is a sustainable and cost-effective way of reducing waste and reusing materials. However, the process of using demolished concrete in roads must be

carefully managed to ensure that the resulting road meets the required strength and durability standards. By following the above steps, the process of using demolished concrete in roads can be successful in creating a high-quality and durable road.

STABILITY

The results of the impact and abrasion tests suggest that using demolished concrete in roads may be a viable option. However, it is important to ensure the stability of this information by conducting further testing and research.

One aspect to consider is the long-term durability of the material. Will the recycled concrete maintain its strength and structural integrity over time, or will it degrade and require frequent repairs? Additionally, it is important to assess the environmental impact of using recycled concrete in roads, including factors such as energy consumption, greenhouse gas emissions, and potential leaching of contaminants into soil and water.

Furthermore, it is important to consider the economic feasibility of using recycled concrete in roads. Will the cost of recycling and processing the material be lower than the cost of using traditional road construction materials? Will the recycled concrete provide similar or better performance compared to traditional materials?

To ensure the stability of the information regarding the use of demolished concrete in roads, it is necessary to conduct comprehensive studies that address all of these factors. This will help to determine whether using recycled concrete in road construction is a sustainable and practical solution that can be implemented on a larger scale.

CONCLUSION

In conclusion, the paper highlights the importance of effective construction waste management and demolition practices in promoting sustainable construction practices. The construction industry generates a significant amount of waste, and if not managed properly, it can have negative environmental impacts. Construction waste management involves planning, monitoring, and control of waste generated during construction activities, while demolition involves the systematic dismantling and removal of buildings and structures. Proper disposal of waste and effective waste management strategies such as recycling and reusing materials can reduce the amount of waste sent to landfills and minimize the environmental impact of construction projects. The paper also emphasizes the necessity of concrete recycling, which can help to reuse concrete rubble as aggregates in concrete, leading to cost savings, reduced truck traffic, and decreased environmental impact. Therefore, it is essential for construction companies and professionals to implement sustainable construction practices by reducing waste, minimizing environmental impact, and promoting material reuse and recycling, ultimately leading to a healthier and more sustainable future for all.

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