

The road concrete  
recycling  
experimental study  
construction essay



**ASSIGN  
BUSTER**

Concrete is everywhere in today. This is the second most consumed material after water. It shapes our built environment. Housing, schools, hospitals, bridges, roads, and footpaths all make use of concrete. Concrete is a good material to build long-and energy-efficient buildings. However, even with Produces good design humane changes in demand and potential waste. In the results generated by the demand Construction and demolition waste, it is estimated 900 million Tons a year in Europe, and the United States

#### **4. 1. 1 Abstract**

Cement Concrete Pavement reaches its useful life, or need to re-built after the destruction of the other reasons, the old concrete waste Often bring the environmental problems of the Giants, and if the old concrete can be applied in new construction. It will bring great economic and social Benefits. This paper discusses the feasibility of closing with the use of the old Concrete; focuses on old cement concrete reconfigure into a cement concrete road: raw materials properties, compressive, flexural, wear. It occurs because of the experimental results.

#### **4. 1. 2 Problems caused by cement concrete pavement damage**

Cement concrete pavement reaches its useful life, or other causes damage such as pavement structure design is unreasonable, improper construction measures, Overloading use, or conservation is not timely, etc. It need to be rebuilt, the general practice is to excavation and discard the old concrete surface layer, Patch grassroots, re-paving. Get rid of the old concrete is often discarded as construction waste, and this raises many problems. As shown in the figures bellowing. Figure 4. 1. 1: Pavement damage Figure 4. 1. 2:

<https://assignbuster.com/the-road-concrete-recycling-experimental-study-construction-essay/>

Pavement damage4. 1. 2. 1The waste discarded bring environmental issues: the old concrete discarded as waste, produce large amounts of construction waste. As concrete materials are inorganic materials, better durability, this garbage is not naturally break down like organic matter. Therefore this kind of pollution will be permanent. Figure 4. 1. 3: Concrete waste4. 1. 2.

2Environmental problems brought about by the exploitation of the material required for new roads: the new road required material exploitation, generally excavation of the surface layer of the mountain weathered rock, the undisturbed rock fragmentation by blasting and mechanical action and as coarse aggregate. Required due to the paving of the road is very coarse aggregate, it will result in people mountain area excavation, a large area of vegetation has been destroyed, resulting in unexpected losses on the environment. 4. 1. 2. 3Other problems: coarse aggregate mining and transport to bring a huge waste of human and material resources, leading to overall economic decline. In short, the traditional road reconstruction, repair lead to social and economic decline and social waste of resources, the need to use the new technology overall improvement. Figure 4. 1. 4: coarse aggregate mining

### **4. 1. 3 The feasibility of recycling old concrete**

Based on these basic facts, if the excavation of old concrete is broken at the construction site, as the coarse aggregate used again to generate significant social and economic benefits, it is to avoid the waste of social resources. From this practice of engineering technology is entirely feasible: Stores venue set at the construction site of the stone crushing machinery, Demolish the old cement concrete in the field, and appropriate adjustments to the

performance of the broken machinery. It can completely be produced to meet the road requirements level with coarse aggregate. Road concrete numerals are generally not high, its hardness is less than the hardness of rock, relatively speaking, and fragmentation on the mechanical requirements is lower. There is no problem with Concrete crushing technology. In addition, with the requirements of the practice, it is also possible to manufacture the mountains suitable for special machinery concrete crushing. On the other hand, in the large and medium-sized cities, there has many commercial concrete mixing station now, they are generally larger venues, and has a variety of concrete market demand. Around the city, the use of the old concrete from the road to promote housing construction, will achieve more significant benefits.

#### **4. 1. 4 The study aiming**

Old concrete recycling has been a lot of achievements. However, these data are too concentrated on the old concrete aggregate of pavement and pavement base, very few old concrete aggregate for cement concrete is considered, in generally the old concrete aggregate is preparation of cement concrete as coarse aggregate, and just added the old concrete aggregate, the added rate is around 30%, the rest of the coarse aggregate is still with gravel aggregate. Much coarse aggregate all use the old concrete aggregates for cement concrete, in order to improve the recoveries of the old concrete, the study focused on the all old concrete aggregates use. Due to the urban scale expansion and strengthening of urban transformation, in fact, many other types of construction waste, such as brick slag. Some discarded material crushing strength may be low, but as the social

production, low-performance materials just in the requirements low places, as much as possible to reach the best has become possible. Therefore, it has configured to the old concrete aggregate cement concrete hope to attract the attention of the parties concerned, to expand research in this area and to expand the scope of the study.

## **2 Old concrete aggregate performance concrete and its configuration (experiment part) (7/28 day experiment)**

### **4. 2. 1 The quality of old concrete aggregate**

The quality of the old concrete aggregates mainly two important aspects: Strength properties and Absorbent.

#### **4. 2. 1. 1Strength properties**

The strength characteristics of the aggregate by crushing the value measured, the following table is a set of data values of crushed gravel aggregates and the old cement concrete aggregates.

**Sample weight(kg)**

**Crushing part weight(kg)**

**Crushing rate**

**Gravel aggregate**

**2730**

**270**

**9.9%**

**Old concrete aggregate**

**2385**

**340**

**14.3%**

Table 4. 1: The comparison of crushing value between gravel aggregate and old cement concrete aggregate

#### **4. 2. 1. 2Absorbent**

Gravel aggregate and old cement concrete aggregate were placed in water, saturated with water after 24 hours, respectively, measured obtaining water absorption. The water absorption of the crushed aggregate was 6%, the water absorption ratio of 12% in the old concrete aggregates, is broken twice aggregates. The old concrete aggregate water absorption Concrete contain more pore. The water absorption of the old concreteAggregate configuration properties of concrete will be explained with in the following.

## **4. 2. 2 Quality of concrete made of the old concrete aggregate**

In order to understand the quality of concrete made of the old concrete aggregates, under laboratory conditions, made comparative tests of concrete made of crushed aggregate and Old Cement Concrete Aggregates

### **4. 2. 2. 1 The workability of the old concrete aggregate configuration Concrete**

**Slump rate(cm)**

**Gravel aggregate**

**5. 0**

**Old concrete aggregate**

**3. 0**

Table 4. 2: The comparison of slump contrast between gravel aggregate and old cement concrete aggregate

### **4. 2. 2. 2 The Bulk density comparison of Gravel aggregate concrete and old concrete aggregate concrete.**

### **4. 2. 2. 3 Old concrete aggregate configuration of concrete compressive strength and flexural strength**

At 7 days and 28 days, the configuration of the two aggregate concrete compressive and flexural specimens from the conservation pool at the same time remove intensity measurement according to specifications. In this experiment, it is to ensure the consistency of the experimental conditions of the two kinds of test pieces. The 7 days, 28 days, compressive strength and flexural strength results tabulated

**7 day strength (Mpa)**

**28 day strength (Mpa)**

**Bending Strength**

**Compressive strength**

**Bending Strength**

**Compressive strength**

**Gravel**

**3. 32**

**19. 3**

**4. 77**

**31. 0**

**aggregate**

**3. 47**

**20. 7**

**4. 67**

**28. 9**

**3. 70**

**18. 0**

**4. 54**

**29. 8**

**Average: 3. 50**

**Average: 19. 3**



**Average: 4. 67**

**Average: 29. 9**

**Old**

**3. 70**

**22. 2**

**4. 89**

**32. 9**

**concrete**

**3. 70**

**22. 1**

**4. 72**

**31. 0**

**aggregate**

**3. 44**

**23. 0**

**4. 63**

**34. 0**

**Average: 3. 61**

**Average: 22. 4**

**Average: 4. 75**

**Average: 32. 6**

Table 4. 3: 7 days/28 days old cement concrete aggregate concrete and gravel aggregate concrete strength comparison

#### **4. 2. 2. 4 The Abrasion loss of the old concrete aggregate concrete configuration**

**Abrasion loss (kg/m<sup>2</sup>)**

**Gravel aggregate Concrete**

**1. 600**

**Old concrete aggregate Concrete**

**1. 544**

Table 4. 4: Concrete strength change of the old concrete aggregate gradation concrete aggregate

#### **4. 2. 3 Analyses**

From the above experimental results it can be seen all use the old concrete aggregate configured as a coarse aggregate to cement concrete method is feasible. The main reason was given below. 1) When Concrete crushing, rupture general development along the weak side of the micro-cracks in the old concrete and cement colloid. Therefore, there are less internal defects of the old concrete aggregate. And the nature of the aggregates is relatively uniform. 2) Old concrete aggregate surface relative to the surface of the gravel aggregate more rough, and therefore more conducive to bonding of cement mortar and aggregates, the prepared concrete strength will not be less than gravel set contrast aggregate concrete. 3) There is greater water absorption ratio of the old concrete aggregate concrete, in the same ratio, the smaller old concrete aggregate formulated concrete water-cement ratio,

which will also help to increase the strength of concrete. 4) Formulated as concrete aggregates, the wear resistance depends on the characteristics of the entire concrete . Because the gel strength of the cement in concrete is generally less than the degree of aggregate, and thus the wear resistance is also lower than the coarse aggregate, so the abrasion resistance ultimately depends on the wear resistance of the cement mortar. Therefore, as long as the strength of the cement gel is less, the wear resistance of concrete is also similar. 5) Old concrete aggregate cement concrete, the aggregates due to conservation increase their own strength.

#### **4. 2. 4 Conclusions and Suggestions**

In conclusion from the above results and analysis: the old cement concrete crushing coarse aggregate fully meet the pavement cement concrete coarse aggregate; intensity and contrast of the old concrete aggregate formulated concrete gravel aggregate concrete compared to no decreases, and even improved to some extent; Crushed Concrete preparation of the abrasion resistance of the wear resistance of concrete and gravel aggregate concrete is basically the same, fully meet the demand of the road. Old road concrete recycling is feasible. The recycling of the old concrete will have huge social and economic benefits. Suggestion: When transform the road, the road of the old concrete recycling as an alternative. Converted comprehensive comparison of the social and economic benefits should encourage the road old concrete recycling. Developed the road recycling old concrete Process: including on-site removal of old concrete panel technology, the old concrete crushing process. Further develop other aspects of the old concrete

aggregate concrete formulated the basis of experimental studies, such as shrinkage and temperature characteristics, and sustainable characteristics.