

Comparison between Quarry Aggregates and Recycled Aggregates based on their Engineering Properties

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Abstract- Aggregate is a very important construction material. It is an important constituent of concrete as well as in pavement construction. The raw material from which aggregates are prepared is natural rock. As rocks are composed of mineral grains held together in a variety of ways, the properties therefore depend on its constituent minerals and the nature of the bond between them i.e. on the composition, grain size and texture of rock, factors which depend to a large extent on its mode of origin. Engineering test of quarry aggregates and recycled aggregates is done in order to elucidate the influence of properties of aggregates in determining the strength, durability, crushability and nature of parent rock. This helps us in selecting the suitable aggregates for the construction. In this report an attempt have been made to study the engineering properties of quarry aggregates and recycled aggregates as well as their comparison.

Keywords: Aggregates, Quarry aggregates, Recycled aggregates, engineering properties and pavement construction.

I. INTRODUCTION

Construction aggregate or simply aggregate is a broad category of coarse particulate material used in construction including sand, gravel, crushed stone, slag, recycled aggregate and geo-synthetic aggregates. Aggregates are the most mined material in the world.

A. QUARRY AGGREGATE-

Quarry aggregate is composed of rock fragment that have a general particle size range and include size classes from granular to boulder-sized fragments.

The quarry is located in Patorkuchi which is 10.2km away from betkuchi.

Site co-ordinates: $26^{\circ}6'12.01''\text{N}, 91^{\circ}48'44.02''\text{E}$.

B. RECYCLED AGGREGATE-

Recycled aggregate is a granular material manufactured by removing, crushing and processing hydraulic-cement concrete pavement for reuse with a hydraulic cementing medium to produce fresh paving concrete. The recycled aggregates were collected from Rukminigaon near HDFC Bank. The site is located 2km away from Khanapara. Site co-ordinates: $26^{\circ}8'8''\text{N}, 91^{\circ}47'57''\text{E}$.

In this report an attempt have been made to study the engineering properties of quarry aggregates and recycled aggregates as well as their comparison.

II.OBJECTIVES OF THE PROJECT

- To carry out engineering tests on aggregates to evaluate their engineering properties.
- To make a comparison between quarry aggregates and recycled aggregates.
- Finally, interpretation of the results to find their suitability as construction.

III. SUMMARY OF ENGINEERING TEST RESULTS OF QUARRY AGGREGATES AND RECYCLED AGGREGATES

A. SIEVE ANALYSIS OF QUARRY AGGREGATES

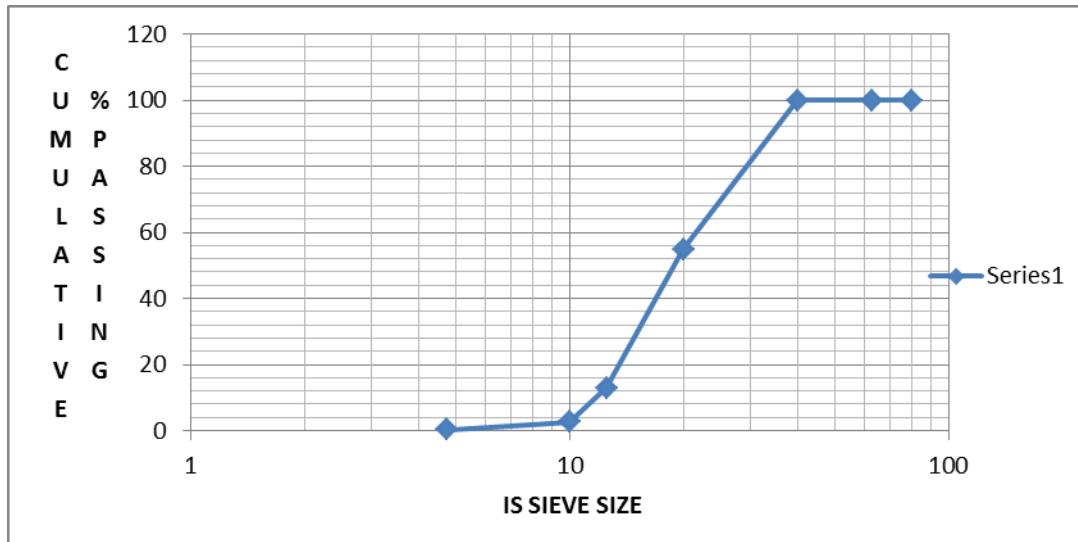


Figure 1. Gradation curve for quarry aggregates

TABLE -1 SUMMARY OF ALL THE OTHER ENGINEERING TESTS PERFORMED FOR QUARRY AGGREGATES

Sl no	Name of experiment	Results
1	Elongation Index	25.47%
2	Flakiness Index	26.96%
3	Specific Gravity	2.69
4	Water Absorption	1.30%
5	Impact Value	20.2%
6	Los Angeles Abrasion Value	29%

B. SIEVE ANALYSIS OF RECYCLED AGGREGATES

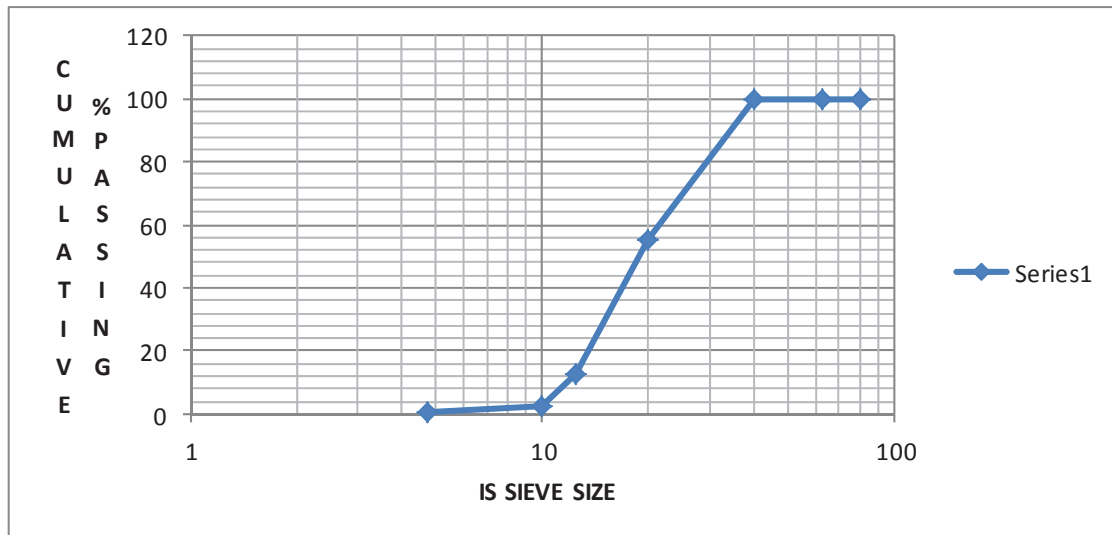


Figure-2 Gradation curve for recycled aggregates

TABLE-2 SUMMARY OF ALL THE OTHER ENGINEERING TESTS PERFORMED FOR RECYCLED AGGREGATES

Sl no	Name of experiment	Results
1	Elongation Index	20.97%
2	Flakiness Index	16.9%
3	Specific Gravity	2.61
4	Water Absorption	4.54%
5	Impact Value	24.1%
6	Los Angeles Abrasion Value	34.6%

IV. COMPARISON BETWEEN OF QUARRY AGGREGATES AND RECYCLED AGGREGATES

Type of aggregates	test performed						Remarks
	Elongation Index	Flakiness Index	Specific Gravity	Water Absorption	Impact Value	Los Angeles Abrasion	
Quarry	25.47%	26.96%	2.69	1.30%	20.2%	29%	All the values of quarry aggregates and recycled aggregates are within permissible limit except water absorption, but the value of water absorption is very much less than the recycled aggregates.
Recycled	20.97%	16.9%	2.61	4.54%	24.1%	34.6%	

V. CONCLUSION

From the above study we can conclude that both the aggregates are suitable for construction purposes since the values of engineering tests are within permissible limits. In some engineering tests quarry aggregates are more sound than recycled aggregates and vice versa.

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