

USE OF GRAVEL AS AGGREGATE FOR CONCRETE

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The requirement of concrete increases with the urban and rural development in Sri Lanka, as it plays the major role in many structures such as; buildings, factories, bridges, water tanks, reservoirs etc.

As a result, the demand for concrete constituents, i.e. cement, sand, metal (crushed rocks) and steel increases rapidly. Due to this rapid demand, the cost of metal (usual 3/4" crushed rocks) is tremendously increased

The Building Research Institute has launched a research program in selecting suitable materials as substitute for metal aggregate, and evaluating its mechanical and strength characteristics. At present we have taken into consideration 'gravel' itself and strength of concrete with gravel aggregate can be given in abstract form as follows :

Important Factors In Selecting Gravels :

1. Gravel can be collected from gravel deposits which are mostly available in the South West sector of Sri Lanka.
2. Collected gravel should be washed thoroughly to remove all clay, mud and organic matter,
 - (a) By manual washing
 - (b) By means of washing plants
3. Washed and dried gravel can be used as coarse aggregate in the following manner :

Mechanical properties required:

1. Grading of selected gravel (particle size: 3/4" upto 3/16" in diameter)
2. Aggregate crushing value - 28
3. Bulk Density - 88 lbs/ft³
4. Specific Gravity - 2.68

Strength properties of concrete with gravel aggregate

1. Mix design in achieving maximum crushing strength
Aggregate / cement ratio - 5.4
Water / cement ratio - 0.5 0.56
Fine aggregate percentage by wt. of total aggregate - 38%
Required crushing strength - 3900 lbs / in²

Further experimental work in building components with gravel:

List of components which are in research stage at present:
Lintals, Floorslabs, wall panels, purlins, etc.

Information of further developments will be published later.

References

Relevant B. S. specifications and code of practices for concrete test procedures.

Concrete constituents and mix proportions—B. W. Shacklock (Cement and concrete Association)

Properties of Concrete—A. M. Neville, (Pitman Publishing)

Crushing strength of concrete made from locally expanded clay aggregates - Ashtaq Hasan, Abdul Qayyum and M. G. Ahmad (Publication of Building Research Station Lahore 1970 issue)

Mineral Resources of Sri Lanka -

J. W. Herath (Geological Survey Department, Economic Bulletin No. 2 - issued 1975)