

Economical Mix Design for Interlocking Block Paving for Sri Lanka

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Rocketed trend of world wide Concrete Block Paving (CBP) adherence to the road network has already influenced the Sri Lanka as a well performing alternative for the rigid concrete pavements which caused many issues over past decades. Even though CBP in larger Production level, significant Standards and Guidelines for basic properties and manufacturing in the Sri Lankan conditions have not been introduced yet. Especially in application of CBP in trafficked road ways seems to be declined as it is not deeply concerned by the authorities due to lack of guidance. In that case the requirement of study in concrete mix design of CBP for roads phenomena was come across.

In an attempt to find the a economical mix design for concrete block paving optimized combination of cementitious and aggregate materials has been developed, which contains cement, sand, quarry dust and chips in intended for the production of interlocked concrete blocks for paving in road pavement. The main purpose was to achieve optimized Concrete Blocks with fulfilling the requirements in road by using alternative aggregates, admixtures and the production cost via materials.

The initial mix design was developed with the use of literature review and besides that other mix proportions were introduced by altering the initial design. First series of blocks were produced by using above mix designs by varying the aggregate-cement ratio (A/C) and water-cement ratio (W/C) between 0.25 – 0.40. Optimized value was selected considering the Compressive strength, Surface texture and Shape (edges). Next series was casted from the selected mix design and sand was replaced by quarry dust in proportion to the total fine aggregate weight. Final mix design was developed with those results and it showed significant high energy requirement compared to the first series.

Seven days Compressive strength of CBP with out quarry dust was varied between 52 N/mm² – 34 N/mm² with in the W/C of 0.25-0.40. It was given 41 N/mm² – 46 N/mm² variations for the W/C of 0.30 after replacing the quarry dust with sand. This has satisfied the required strength of 35 N/mm² for the commercial vehicles. All mix designs produced zero slumps. Compressive Strength has correlations with the A/C, W/C, Density and Sand Percentage. W/C inversely affects the shape and texture.

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In conclusion, Sand can be replaced by quarry dust as a successful alternative aggregate with a unique proportion. W/C ratio plays major role while restricting to upper limit to fulfill surface texture and shape. Quarry dust improves strength with a unique proportion of sand while acquiring more energy in production.

Key Words: Concrete mix design, Concrete block paving, slump, Quarry dust, compressive strength