

TRANSLATING RESEARCH & INNOVATION

In the Built Environment for the Tropics

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Building and Construction Authority



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CHAPTER 8

Eco-Green Building



Use of Recycled Concrete Aggregate (RCA) for Structural Concrete



The project evaluates the use of Recycled Concrete Aggregate (RCA) in structural concrete for building construction. RCA is derived from the processing of Construction and Demolition (C&D) waste. There has been much scepticism on the use of RCA as most literatures reported that it has adverse effects on concrete properties. As such, its applications were limited to non-structural applications prior to this research project. Extensive laboratory testings were conducted to evaluate the engineering and durability properties of concrete containing RCA (RCA concrete). Using a three-pronged approach, with emphasis on processing of C&D waste, quality control of RCA and mix design method, RCA was effectively incorporated in concrete. RCA concrete was found to achieve comparable performance against conventional concrete mix containing natural aggregate.



Samwoh Eco-Building



Samwoh's Batching Plant

POTENTIAL APPLICATIONS

The three-storey Samwoh Eco-Green building, first in the region to be constructed using up to 100% RCA, has built confidence in the use of RCA concrete. This is a technology breakthrough in the construction industry and has demonstrated the feasibility of RCA concrete for structural applications. BCA has allowed the use of up to 20% RCA to replace coarse natural aggregate for the production of structural grade concrete and RCA concrete has also been accepted in the Green Mark Assessments for New Residential and Non-Residential Buildings.



Recycled Concrete Aggregate



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 Samwoh Corporation Pte Ltd



“According to NEA’s statistics, the amount of C&D waste generated every year has always been one of the highest. The disposal has posed great pressure on our limited land space. Moreover, there is a strong reliance on imported natural aggregates to fuel the construction industry and the cost has been rising over the years. We envisage that this challenge will escalate to a new magnitude if the situation continues at current pace. As such, Samwoh has started recycling C&D waste since early 2000 as we envisaged that the recycled C&D waste is able to provide an alternative source of material for the nation.

The research team comprises experienced researchers, engineers and academics specialising in civil engineering and concrete technology. A special laboratory test equipment was developed to evaluate the creep or long-term deformation properties of concrete, providing a comprehensive evaluation of the long-term performance of concrete containing RCA. Through extensive laboratory tests, a rational mix design method was developed to show that the use of RCA in concrete is able to provide comparable performance to conventional concrete containing natural aggregate. This led to the construction of Samwoh Eco-Green Building, a three-storey office building using up to 100% RCA in concrete. The building has also been awarded with many prestigious accolades which include the Top 50 Engineering Feats 2016 @ IES-SG50, ASEAN Outstanding Engineering Achievement Awards 2015, etc.

Though the Built Environment has improved tremendously over the years, we believe that the use of innovative and productive technologies can further enhance and inject a new lease of life in the future Built Environment. With these collective efforts, we are confident that the industry will embrace the idea of sustainable construction and consumers will be more receptive towards environmental sustainability. Eventually, Singapore can become a truly zero-waste nation while shaping into an active and gracious community supported by a leading green economy.”

Samwoh Research Team

Samwoh Corporation Pte Ltd