

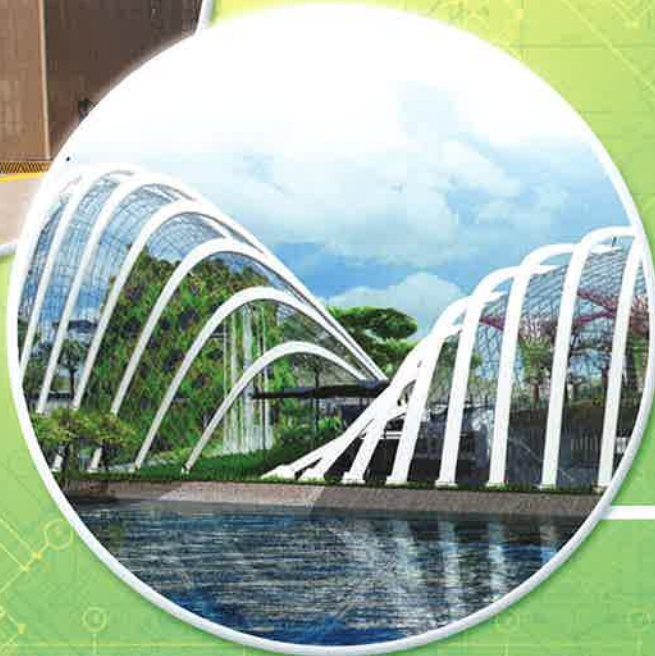
CONNECT 2 ACES

A QUARTERLY PUBLICATION BY THE ASSOCIATION OF CONSULTING ENGINEERS SINGAPORE



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RCA IN STRUCTURAL
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"We are glad to inform everyone that the Association of Consulting Engineers Singapore has shifted her Secretariat office to the new Midview City. This office space is owned by ACES. After 40 years, ACES finally owns an office, through the hard work and efforts of all ACES members."

Efficient Use of RCA in Structural Concrete

CONTRIBUTED BY SAMWOH CORPORATION

In response to the government's call for sustainable development, there is a need to divert the construction and demolition (C&D) waste away from the landfills and to source for alternative materials to replace the natural aggregate so as to conserve the natural resources as well as to reduce our strong reliance on imported materials. Indeed, the use of recycled concrete aggregate (RCA), which is processed from the C&D waste, in structural concrete is one of the feasible solutions to the aforementioned concerns.

Samwoh Corporation, a leading integrated construction company and green products supplier, has embarked on an ambitious and



Extensive R&D works have been carried out before the construction of Eco-Green Building

forward-thinking demonstration project to construct the Samwoh Eco-Green Building. The building, which houses the Samwoh R&D

Centre, is the first building structure in the region using concrete with up to 100% RCA to replace the natural aggregate. It has attained the



C&D Waste Recycling Plant



Samwoh R&D Centre

highest level in the BCA Green Mark certification – the Platinum Award, in 2010.

The project comprises two stages. The first stage involves extensive laboratory evaluation of the performance of concrete with RCA. The second stage is to construct a three-storey building using concrete containing RCA with advanced instrumentation embedded in the

building to monitor the performance of the structure. The key findings from the laboratory works are summarized as follows:

- Properties of aggregate** – Good quality of RCA can be obtained through the proper setting up of recycling plant and implementation of stringent quality control system in processing the C&D waste.
- Shrinkage and creep** – Concrete containing RCA gives higher drying shrinkage and creep properties as compared to conventional concrete. However, the differences have no significant impact on the structural applications.
- Durability** – The resistance to water and chemical ingress for concrete containing RCA are matching the corresponding properties of conventional concrete.
- The test results showed that the concrete produced with RCA can be designed to achieve the structural design parameters using our proposed rational mix design method.

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- Workability** – Concrete with high RCA content tends to exhibit lower slump value due to the absorptive nature of RCA. This issue can be addressed through our proposed rational mix design method.
- Strength** – Concrete containing RCA can be designed to achieve the required strength.

The accomplishment of Samwoh Eco-Green Building has opened a new chapter in sustainable development in Singapore. The Eco-Green building showcases a breakthrough in construction technology by using concrete with up to 100% RCA which is beyond the existing design code limits. The data obtained from the project are useful for the updating of existing building code requirements to allow the use of RCA in all buildings in the future. As such, we are able to take a massive step forward to achieve the nation's goal of sustainable development.



Samwoh Eco-Green Building – BCA Green Mark Platinum Award