

# The use of lightweight aggregate in concrete structures to reduce costs and environmental impact

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## Summary

Georgia's research considers the use of lightweight aggregate in concrete design to extend the lifespan of concrete structures by making them less susceptible to cyclic freeze-thaw conditions. In the future, it is likely that the use of lightweight structures will reduce the costs for the construction sector and have a lower environmental impact.

## Background

Scotland's harsh winter climate can play havoc with traditional concrete structures. A typical season sees periods of freezing temperatures, followed by a thaw, then low temperatures again. Over time, the concrete deteriorates and requires repair. This project will deepen understanding of deteriorating mechanisms and help to stop accelerated damage.

## Challenges

The behaviour of lightweight aggregates is neither well understood nor well-researched, making it difficult to compare results with other research teams.

## Benefits

Lightweight aggregate also makes for lightweight structures. This comes with a range of benefits, the most important being their lower dead weight. Structures with lower dead weight allow for savings in foundation design, reinforcement and transport costs. Load bearing elements can be decreased in size, a feature that is beneficial in bridges or other big-impact structures. In bridge design, in particular, a lower dead weight will potentially mean that the structure can cope with higher traffic loads. If lightweight aggregates are found to be beneficial for concrete structures, this would allow the potential for significantly reduced costs and reduced challenges during the build phase.

**Dr Chris Clear**, Technical Director BRMCA, Mineral Products Association, UK:

“The freeze/thaw project is timely and relevant for the UK concrete construction industry. To continue to produce more sustainable concretes we must ensure that the constituents used equal or outperform traditional materials whilst ensuring that costs are kept low for the client.”

